Castalia, the Game of Ends and Means

Glass Bead

The first issue of this journal, as well as *Glass Bead*'s project at large, is directed towards rethinking art as a mode of rational thought. This engagement stems from a shared discontent with art's ongoing exclusion from reason, its positioning at the peripheries of knowledge, and its resulting political inconsequentiality. Our project departs from the assumption that any claim concerning the efficacy of art—its capacity, beyond either its representational function or its affectivity, to make changes in the way we think of the world and act on it—first demands a renewed understanding of reason itself.

It might come as a surprise to our readers that while it is an art journal, *Glass Bead* offers no critical reviews, no art-historical texts on specific works, artists, or exhibitions. None of the discursive practices that commonly surround and legitimize art are present in this journal. This absence is determined by *Glass Bead*'s methodological decision not to address art from a pre-constituted identity, but rather to dynamically define its role through the exploration of other forms of reasoning (science, philosophy, politics, art, etc.).

While it foregrounds transits between disciplines, *Glass Bead* is not an interdisciplinary journal. In all its scholarly enthusiasm and benevolence, interdisciplinarity has now become some kind of empty motto. Starting from already constituted disciplinary identities, interdisciplinarity seeks connections whose broader impact on the forms of knowledge they connect are consequently silenced. As such, it appears unable to move beyond the implicit equivalence posited between the things it connects. By emphasizing direct, local connections, it proves particularly inadequate for addressing the hierarchal organization of the global structure of knowledge on which it rests.

Whereas interdisciplinarity seeks connections between fields of knowledge whose identity it ultimately leaves intact, our point of departure is rather that of a fully plastic and generic space of thought—a continuum of heterogeneous reasoning gestures, binding abstractions, and concrete determinations in a game of ends and means. From this point of view, a discipline can be understood as the particular and local instantiation of a group of conventionally constrained gestures operating within this continuum. It is only by recognizing the constitutive dynamics and differences between these diverse groups of gestures (i.e., the way each discipline unfolds its structural specificity through the generic space of thought) that artistic practices can hope to navigate this space and to have any traction on the global structure of reason.
It is this project of intrinsic navigation that *Glass Bead* wishes to take on.

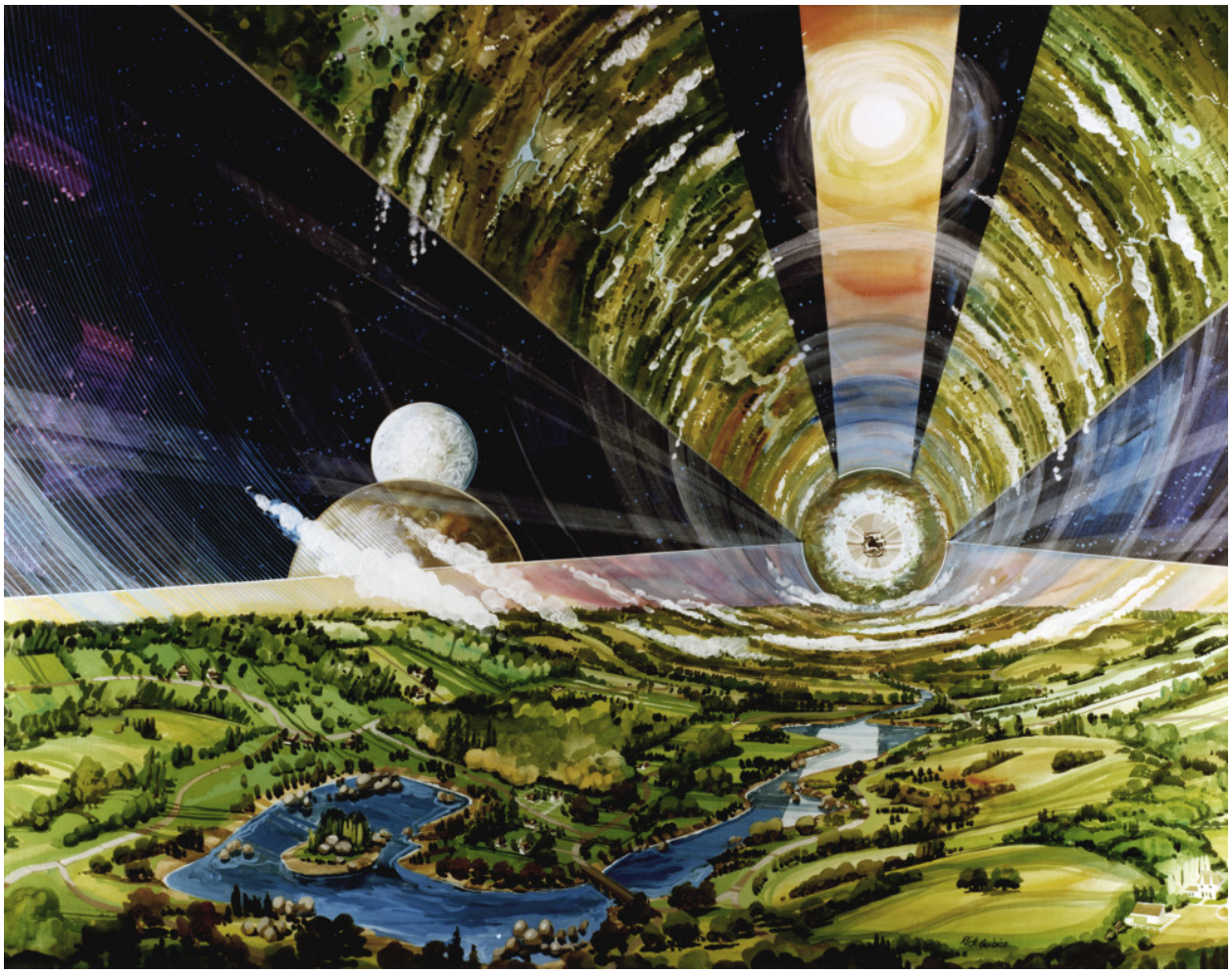
A Renewed Abstraction

Such an attempt is necessarily twofold. To rethink art's position within reason and its efficacy within the world demands an enlarged conception of what abstraction is and can do. This task first requires that we clearly distinguish abstraction as we intend it here from its common understanding within the context of art theory as a defined aesthetic (e.g., formalist abstraction, abstract expressionism). Neither a genre nor a specific domain of practice, abstraction must be understood as the generically constitutive activity through which humans come to define and transform themselves and the world.[1]
This widened approach to abstraction then calls for a renewed exploration of the function of art within the wider sphere of rational activity. Today, art's complex relation to abstraction can be schematically characterized by a general inclination towards a dynamics of retreat and seclusion. On a social and political level, there is a widespread tendency to oppose the systemic movements of the global economy by engaging with local particularities and seceding from these global movements of abstraction. In a society increasingly saturated with capitalistic vectors of abstraction, artistic and curatorial practices have attempted to safeguard aesthetics as an intuitively accessible common space surpassing all boundaries and overflowing all determinations. This immediacy also works on an epistemic level, where artistic production is seen as an alternative to the disembodied objectivities and overarching universals that modernity is criticized for having produced. Such a stand promotes a conception of art which, by way of a direct sensible relation to forms and materials, promises to rebind our knowledge with the alleged spontaneity of experience.

What these contemporary threads have in common is the idea that we can avoid the labor of abstraction by intuitively accessing the indeterminate expressive potential of the artwork. They are based on the shared belief that art, in its contemporary form and self-proclaimed epistemological and social immunity, can somehow be the guarantor of liberation from abstraction. Doing so, these threads implicitly promote a conception of freedom as that which is only achievable through the paradoxical coupling of flight and refuge. On the contrary, *Glass Bead*'s contention is that, in regards to abstraction, there can be no escape, no respite, no sanctuary[2]. No spontaneous knowledge can be reclaimed nor immediate social order be retrieved. To affirm the contrary is to fall prey to the yearning for an irreducible real, the inexhaustible search and delayed promise of a lost kernel of freedom. Obsessed with its own agency, contemporary art tends to embrace this myth, therefore misapprehending the very space of its operations and further intensifying its epistemic and political inefficacy.

The distinction between the abstract and concrete can neither be posed as a rigid separation nor as a fluid mixture. On the contrary, the dialectical interpenetration of the terms requires an ongoing process of elaboration, redefinition, and exploration of the ways in which they are co-articulated. Making a move on the concrete ground always presupposes simultaneously stepping on the abstract plane that enables this movement. A simple act such as aiming at a destination and moving towards it implies both the physical trajectory of a body through space and the mental unfolding of a "line without thickness,"[3] without any correspondence whatsoever with the materiality of its terrain. Although it lies outside of the world and no sensible access to it is possible, this abstract line serves as a guide for the spatial organization of behavior. Any level of rational engagement with the world, being either physical, social, or conceptual entails a capacity for making complex mediations binding the concrete and the abstract. This capacity is inferential: it proceeds by and through reason[4]. Just as there is no navigation through a territory which is not to some degree correlated to a map, there can be no social organization or knowledge of the world without this dynamic entanglement. Likewise, just as any form of knowledge requires an articulation between the particular and the general, the construction of a common political horizon cannot be reduced to the immediacy of interpersonal relations. It necessarily involves the constitution of an abstract community: a movement of oscillation between the specificity of individual links and the global coherence of their mode of connexity.

The space opened by the dynamical binding of the abstract and the concrete is therefore an inferential space. It is a space modulated by the very gestures which enable it and constitute its fiber. All human activity to some degree or another pertains to this space. No one, including artists, can claim secession from such a space. Art, like any other practice, is embedded in this fabric of gestures. This is why any ambition to consider the role that art can play today, either in social or in epistemic realms, must first unfold as an operation on the very structure of the space of reasoning gestures.
Questions about the efficacy of art thus become spatial questions: How can we operate transformations on a space in which we are immersed? How can art participate in these transformations after having contested its exceptional position? How can these transformations be enacted without calling to any meta-gesture?



View of an O'Neill Cylinder, model for long term space settlement (Rick Guidice, 1967, Nasa Ames Research Center)

The Space of the Game

To explore these questions requires first locating the institution of art and its historical constitution within this space. This localization entails, on the one hand, regionalizing art as a local modality of the wider, generic space of thought and, on the other hand, affirming art as a practice of abstraction and navigation between increasingly specialized yet overlapping domains of thought.

Historically understood, the constitution of the contemporary space of art can be read as a series of determinate negations that both transformed its ontology and instituted powerful forms of social critique. However this trajectory has also bound itself to a process of self-inflicted confinement and institutionalized myopia. Throughout modernist art theory, aesthetics can be said to have produced a constant mirroring between the "figure" of the modern subject and the "background" provided by a unified concept of nature.[5] As such, the space of art, from its modern inception as aesthetics, can be understood as both a negation and a reaction to the manifold scales of abstraction that modernity introduced in the world: the increasing scientific objectification of nature by Enlightenment rationality, the technological externalization of experience brought about by mechanical reproduction, the division of labor and the fragmentation of social life provoked by the advancing front of capitalist modernization. Operating at the margins of this rationalization of experience, and at the borders of the technological and social engineering of the modern psyche, aesthetics instilled forms of perceptual synthesis in the chains of mediation that modernity produced between the subject and the world.[6] Doing so, it occupied a paradoxically central and extra-territorial place in the topos of modern rationality: from the Romantic sublime to modernism's transgressive ethos, art has been considered in excess and in exception to these rational operations, conceived as the reflexive tool for the production of openings outside rationality and conceptual production.

This conception of aesthetics as a bastion of immediacy standing up to the rationalization of experience has led art, in its most symptomatic contemporary form, to picture itself as a space of production of affects intractable to scientific thought, and receding into the ineffable. Contemporary art generally carries this critical project by foregrounding an endless play of indeterminate signification that consigns the function of the artwork to the generation of a meaning safeguarded from its evacuation by rational explanation. It puts forward an understanding of creativity and freedom as that which can only be achieved by escaping a rationality it pictures as reductionistic,

'scientistic,' and suffused with the unconscious forces of class and libido. Doing so, it paradoxically projects the different scales of abstraction inherent to rationality into the background, as an implicit condition with which it becomes impossible to engage. Contemporary art, on the one hand, tends to counter its instrumental or functional reduction to means by foregrounding the unpredictability of its materials, its openness to different outcomes, and its multi-perspectival social inclusiveness—all of which is condensed in the institutionalized formula known as relational aesthetics. On the other hand, it opposes any reduction to ends by affirming indeterminate play, affective uncertainty, and semantic ambiguity. In constructing an image of freedom based on the irreducibility of creative expression to both ends and means, it tends to lose the capacity for engaging in the revisionary-constructive elaboration of freedom. In excluding itself from all forms of practical or theoretical reasoning, art is condemned to oscillate between an illustrative function reflective of and subordinate to knowledge, and an ineffable expressive capacity that is irreducible to any rational measurement, explanation, or instrumental use. Far from having fully acknowledged the bankruptcy of the conceptual framework of modernism, contemporary art has universalized it, projecting it into a transnational utopia of free market fluidity. As such, the contemporary "expanded field" (Rosalind Krauss) of art merely performs, semantically and materially, the neoliberal crisis: it is obsessed with escape, but knows of no outside; it insists on its agency in the world, but disavows any direct causal, logic, or pragmatic impact on it.

Glass Bead contends that this picture of the space of art (its long history of ontological catastrophes and its present epochal deadlock) rests upon a misdiagnosis of the relation between cultural production and rationality.[7] The fact that scientific rationality and technological abstractions destabilize and transform our default—manifest—apprehension of the world must be understood as the starting point for the artistic enterprise, rather than as a cognitive and political pathology that art should remedy. As much as art cannot simply be mobilized to cure dysfunctional forms of politics through social activism, nor can it simply be considered a social mediator between more specialized and less accessible fields of knowledge production (such as philosophy, physics, mathematics, climatology, geology, etc.).

Rather than considering that art can excavate an immediacy concealed by such specialized forms of knowledge, we understand artistic practices as modes of thought mediating forms of conceptual and material operations.[8] Understood as operating within the rule-governed space of rationality, working at once through abstraction and material

contingencies, artistic practices cut across the abstract plane against which these specific forms of knowledge are designed and isolated, questioning their relative distribution, and therefore potentially destabilizing and transforming the ground on which they rest. Rethinking the relation that art entertains with abstraction therefore implies conceptualizing it as a site of experimentation for the mutual penetration and destabilization of thought and matter, making explicit and thus transforming both the static picture of their traditional opposition and their overly fluid mixture in contemporary critical theory. Claiming art as a site of operations on abstraction hence means mobilizing art as a technique of reorientation of thought, out of its candid intuitions of itself and headlong into the complex ramifications of its diverse engagements in the dynamics of political, epistemic, and sociocultural formations[9].

A Model for Navigation

While this entails considering that art is as much a part of reason as other fields of thought such as science and philosophy, it does not mean that these disciplinary divisions can be forced into false equality[10]. In order to understand both the differences and the unity of these modes of reason it is necessary to acknowledge the immanence of the activity of modeling to thought. A model is an abstraction that intervenes in the reciprocal development of means and ends. There is no intelligence without modeling and abstraction. Only the automaton exists in the concrete immediacy of the world. For logic-using agents, playing the game of ends and means is not a choice but a necessity. We either passively accept models, by organizing ends and means according to their implicit rules and their often brutal abstractions, or, by making their rules explicit and revealing the form of their abstractions, we can actively question models, transforming ends and means in the process.

A fundamental characteristic of the model, and of intelligence in general, is the spatial organization of possibilities. All knowledge presupposes a gestural level of constitution, a movement by which the concrete is perturbed by an abstract line. This gesture of abstraction at once reduces the world by a ruthless act of disregard, and at the same time augments it by introducing new possibilities, transforming the available means and generating unprecedented ends. However, although modeling is a rational procedure of abstraction at every level of sapient interaction, the different ways in which science, philosophy, and art relate to this activity need to be distinguished.

Scientific theories model nature; they refer to an aspect of the world and are subject to experimental validation or logical argumentation on this basis. Though it may represent or refer to some aspect of the world, a work of art, by contrast, also constructs a world. In this it is fundamentally self-referential. It refers to the act of reference; it models the activity of modeling. In that sense, it is different from scientific reasoning. Scientific reasoning is naturalistic; it is true or false depending on what is or is not the case. Artistic reasoning is a properly normative activity defined by the discursive pertinence of its imaginative construction. It projects a could or a should, an ought to be that is irreducible to any naturalistic determination of what is. Yet, this does not mean that science is purely descriptive while art is purely prescriptive. Scientific models are also constructive—they are not passive, neutral, or static with regard to their object. A model orients activity and may have performative or counter-performative effects on the world it describes. A model, such as that picture of the world implied by a scientific theorem, is a structurally constrained system or instrument defined by the functionally constrained purposes it serves, a reciprocal coordination of means and ends that alters the world it pictures[11].

Science makes means subordinate to ends (for example when it states that the function of life is reproduction), while contemporary art is allergic to any singular imposition of ends (it refuses any reduction to a single purpose). However, if a scientific model allows for an object within the world to be grasped, an artwork, like a philosophical argument, has the capacity to grasp the act of grasping itself. It is all too easy to see this in meta-theoretical terms, by subordinating these heterogeneous forms of thought to a master narrative, such as the Platonic conception of philosophy or the Romantic conception of art. However, in constructing a world, a work of art functions as a device for navigation in this world, as a technology for the production of spatial and temporal syntheses, and is thus a crucial facilitator for the creative organization of behavior. *Glass Bead* thus foregrounds art as a local site of abstraction within the global space of thought—a site from which one can not only map but navigate different scales of complexity, a site from which thought can mobilize itself for its self-transformation both at the global level (its general cognitive scaffolding) and the local level (its specific conceptual and disciplinary domains, art being one of them). In such a conception, art becomes a specific yet generalized mode of navigation across diverse fields, especially equipped for the construction of knowledge syntheses. Such syntheses therefore imply going beyond the simple connections that could be made between them, be they thematically, methodologically, or performatively articulated. To consider art practices as

modes of navigation involves acknowledging that any mediation between distinct fields also alters the global structure of the space in which it happens. To navigate hence does not only mean to connect different things, but to address the dynamic type of space that such navigation constructs[12]. Considered in these terms, the question of knowledge syntheses becomes both an epistemic and a political issue, since the spatial models according to which such syntheses can be constructed are not simply determining what is possible to know, but also what it is possible to do.

Topos, Site, Transfers

Following such a spatial account, navigation and knowledge synthesis can be conceived as procedures pertaining to dialectical articulations between, on the one hand, local and specific operations, and, on the other hand, global and generic models according to which these operations can be extended[13]. Yet, such procedures remain to be constructed. In historical terms, we are left with two inherited models of spatial organization which, in our view, are equally inadequate to produce such syntheses. While modern universalism worked as a global projection superseding localities that were not considered able to alter its global structure, the postmodern critique of universalism foregrounded relative trajectories that, working from one locality to another within that structure, have been considered to prevail over any global system. By either forcefully projecting the global onto the local, or rather excavating the local regardless of its relation to any global structure, these two opposed spatial models remain relatively unable to achieve any articulation between these dimensions.

Aiming to move beyond these insufficient spatial models, each issue of the journal is dedicated to the exploration of a *site*[14]. A core concept of *Glass Bead*'s methodology, the notion of site is defined in broad terms. Designating a geopolitical locality as well as a conceptual territory, a fictional entity, a musical expression, or a material formation, a site indexes for us at once an area or a region situated at the intersection of different forms of knowledge, as well as its aesthetic, political, and conceptual stratifications. Far from reducing the site to a topographic point in the space of knowledge, the journal aims to unfold it as the spatialization of a dynamic epistemic figure that cannot be understood through extrinsic determinations alone, but rather through an intrinsic mode of navigation and orientation[15]. The sites that the journal will explore can thus be seen as instruments for the transformation of the epistemic conditions in which they operate. For us, these sites act as vehicles for travelling across multiple disciplinary regions and scales of abstractions.

Although it draws on the way in which this concept has been framed in art theory since the 1960s, our conception departs from its close connection to both specific geographic places and calls to the situatedness of aesthetic experience. The anti-formalist discourses that promoted site-specificity supported the materialist critique of the autonomous artwork. But, as the concept of site has been increasingly identified with an enclosed, absolutely specific locality, it has now become a political and artistic deadlock. By reducing forms of knowledge to the identity of their local point of emission, the localist approach to sites fails to articulate their global ramifications.

Our approach to the concept of site takes its inspiration from contemporary mathematics, in which the concept of space has been radically enlarged. From Category theory to Topos theory, the recent history of the discipline has been marked by a generalization of geometry aiming to reintegrate and synthesize increasingly diverse and specified fields and practices.[16] Broadly put, this process has been that of a progressive and irreversible mutation: a double process of emancipation where geometry was progressively freed from the ascendency of direct experience, and where any external frame of reference was abandoned in favor of an ever more intrinsic apprehension of space. This historical mutation had two phases. First, through topology in the nineteenth century, where space was no longer simply understood for what it is in a given state but for what it can possibly become, and where notions of scale and measurement gave way to an emphasis on continuous transformations and on the limits of such transformations. Secondly, through Topos theory in the 1960s, where topology was extended and generalized to the epistemology of mathematics itself. Descending one step further in the intrinsic geometry, Topos theory conceived the diversity of mathematical theories as sites, understanding them as spatial entities possessing their own borders and continuities. By identifying invariants and possible translations among and across these sites, Topos theory can be said to have prolonged and completed the conceptual revolution initiated in the nineteenth century. In elaborating the mathematical notion of site, it thus opened to a conception of space that, rather than acting as a mere container, can be understood as forming itself through the dynamics of binding and transforming its modes of reasoning[17].

This does not mean, however, that such mathematical theories should be seen as ready-made models that it would suffice to import into other conceptual domains. We do not advocate a literal application of mathematical models to art, but neither do we mobilize them as mere metaphors. Rather, by mobilizing the concept of site as a vehicle

allowing for the binding and transformation of diverse modes of reasoning, our relation to contemporary mathematics is marked by a commitment to elaborate its project of dynamic synthesis and unification within the cultural realm.

Site 0: Castalia

The site on which this issue focuses is Castalia, the fictional province imagined by Hermann Hesse in *The Glass Bead Game* (1943). Set in Central Europe some five hundred years in the future, Castalia hosts a peculiar society entirely dedicated to the pursuit of pure knowledge. In this cloistered setting cut off from the world and its historical and political vicissitudes, the monastic inhabitants of Castalia, unencumbered by technological or economic concerns, are free to develop obscure objects of enquiry devoid of practical implications in the world. Hesse presents Castalia as an idealized vision of the modern university, encapsulating the humanist search for universal knowledge, in which the Game provides an aesthetic ground for the unification of ideas beyond disciplinary frontiers. The apex of this scholarly order is the mastery of a complex interdisciplinary game that synthesizes all forms of knowledge, in which musical motifs, philosophical propositions, and scientific formulae all occupy the same rarified epistemic space.

Mobilizing Castalia as an equivocal image, at once archetype of modern universalism and fortress delegitimized by its own enclosure[18], our aim in this issue is to revisit and transform the Castalian model for the unification of reason. Opening Castalia and its modernist locus to the widened conception of space engendered by contemporary mathematics provides the conditions for the reformulation of a truly dynamic and transformative game of synthesis. Our project here is not to rebuild the old foundationalist dream of a completed universal language, nor to reconduct the standard critique of rationality, but rather to construct the conditions for dynamic transits that can transform the milieu in which rationality operates. Exploring *Glass Bead*'s conceptual, political and methodological prerequisites, this site o lays the ground for our project at large. It gathers contributions exploring the very nature of the space of modern rationality figured by Castalia, as well as the ways in which the contradictions of this space can be outstripped. This issue is comprised of essays by, and interviews with, philosophers, mathematicians, artists, art historians, curators, anthropologists, and theorists exploring contemporary forms of thought that, while recognizing the diversity of contexts in which specific forms of knowledge are produced, aim to produce universal yet dynamic forms of syntheses between them.

Contrary to the glass bead game, in which the synthetic means at play are articulated to purely contemplative ends, our contention is that any synthetic game always implies a reciprocal articulation between ends and means. Implicitly based on the free play of ideas in a purified aesthetic realm, the game imagined by Hesse conceptualizes reason as an activity that can only be perfected according to its separation from social and political relations. This issue of the journal rather draws on the assertion that reason is primarily grounded in practical orientation, socially embedded in discursive and non-discursive practices as well as relatively formalized conceptual frameworks. *Site 0: Castalia, the Game of Ends and Means* seeks to rearticulate the game of synthesis imagined by Hesse by modeling it as an intrinsic modulation of ends and means, therefore enlarging not only the space of knowledge, but also that of action.

Making a move in this game of ends and means is necessarily bound to a collective act of self-transformation. Playing this game entails committing to an ongoing process of construction and revision that continually changes its nature. It does not leave us intact as players by preserving what we are but involves us in a constant redefinition of what we can be and ought to be.

The editors want to thank all the contributors to this issue, as well as all the workshop participants and speakers that took part in this first year of research. Their work has been a crucial and general influence on our conception of this project and the writing of this editorial.

Footnotes

1. See the Audio Research Program, Reza Negarestani, *What Philosophy Does to the Mind*
2. See in this issue Laboria Cuboniks, “Xenofeminist Manifesto : A Politics for Alienation”
3. See in this issue Giuseppe Longo, “The Consequences of Philosophy”
4. See in this issue Ray Brassier, “Transcendental Logic and True Representings”
5. See in this issue Anselm Franke, “The Third House”
6. See in this issue Linda Henderson, “The Forgotten Meta-Realities of Modernism: *Die Uebersinnliche Welt* and the International Cultures of Science and Occultism”
7. See in this issue Amanda Beech, “Culture Without Mirrors—Restructuring Creative-Cognitive Power”
8. See in this issue Tristan Garcia, “The Photographic Real”
9. See in this issue Mat Dryhurst, Holly Herndon and Alex Williams, “Re-Engineering Hegemony”
10. See in this issue Gabriel Catren, “The Trans-Umweltic Express”
11. See in this issue Freeman Dyson, “The Way of the Pacific”
12. See in this issue Tarek Atoui, “Transformative Circuits“

13. See in this issue Martin Holbraad and Eduardo Viveiros de Castro, “Ideas of Savage Reason”

14. See in this issue Keller Easterling and Benedict Singleton, “Forging Rules”

15. See in this issue Deneb Kozikoski, “The Turn of the Canoe”

16. See in this issue Olivia Caramello, “The Theory of Topos-Theoretic Bridges: A Conceptual Introduction” and Andrée Ehresman & Mathias Béjean, “The Glass Bead Game Revisited: Weaving Emergent Dynamics with the MES methodology”

17. See in this issue Fernando Zalamea, “Multilayered Sites and Dynamic Logics for Transits between Art and Mathematics”

18. See in this issue Guerino Mazzola, “Melting Glass Beads : the Multiverse Game of Gestures and Strings” and Peter Wolfendale, “Castalian Games”

Glass Bead is an international research platform and journal. Glass Bead was conceived and is run by Fabien Giraud, Jeremy Lecomte, Vincent Normand, Ida Soulard and Inigo Wilkins.

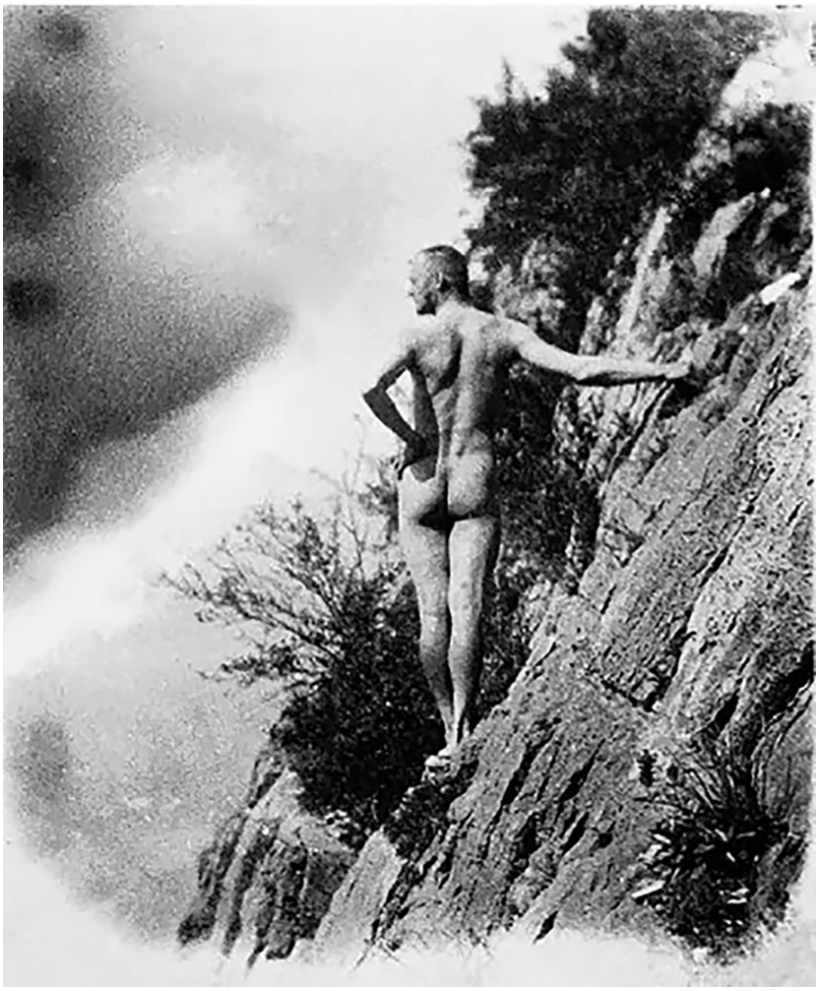
Castalian Games

Peter Wolfendale

Precisely what it means for a work of fiction to be *speculative* remains a matter of some controversy in literary circles. I do not intend to settle the debate on these matters, but rather to present *The Glass Bead Game*—Hermann Hesse's final and most acclaimed novel—as a paradigm of fiction's *speculative* potential.

Hesse's novel is many things. It is clearly modernist in its style, playing with the elements of a classical bildungsroman. It is rigorously hypothetical in its setting, extracting a handful of tendencies from its present, projecting them into minimalist future. It is deeply philosophical in its scope, explicitly referencing the canon of modern European philosophy, implicitly encoding its themes in institutions and characters, and symbolically crystallizing their tensions into a singular conceptual innovation, the Glass Bead Game—a universal language and emblem of intellectual synthesis.

However, there are equally things it is not. Its stylistic modernism does not collapse into *formalism*, either in the critical sense of eschewing connections to its context or the technical sense of prioritizing structure over substance. Its hypothetical setting belongs neither to science fiction nor to fantasy, scrupulously avoiding both *naturalistic reflections* and *fantastical narratives*. Its philosophical ambition does not translate into didacticism, refusing reduction to either historical prediction or allegorical moralism. The life of Knecht in Castalia is a peculiarly austere hypothesis. Its carefully delimited deviations from the actual serve to evoke and embody ideas drawn from philosophy rather than science or mythology, but what the story extrapolates from them is less a singular thesis cloaked in narrative than an intricately crafted opportunity for further thought. The *hypothetical austerity* of Castalia forms the basis of the *speculative richness* of the Game.



Hermann Hesse enjoying naked mountaineering in Amden, photographed by his first wife Maria in summer 1910. (Image: German Institute of Literature in Marbach)

I. Castalia

Hesse presents Castalia as the natural evolution of the ideal underlying the modern university—the *universitas litterarum*—encapsulating the humanist search for knowledge and self-understanding, by uniting teaching, research, liberal arts, and exact sciences in the same institution. In establishing the Game as the symbol of Castalian culture, he presents it as the embodiment of this ideal:

> *The same eternal idea, which for us has been embodied in the Glass Bead Game, has underlain every movement toward the goal of a universitas litterarum, every Platonic academy, every league of an intellectual elite, every* rapprochement *between the exact and the more liberal disciplines, every effort toward reconciliation between science and art or science and religion.*[1]

However, the Game also symbolizes the form that this reconciliation takes within Castalian culture. Castalians study scripture and theology, music and poetry, and can appreciate and even recreate their subtle nuances, but they are neither believers nor artists, refusing either to practice or to create.[2] The Game's combination of high ritual and subtle creativity enables it to subsume the role of both religion *and* art within Castalian society. This subsumption is not merely a shift in the value placed in certain activities—it corresponds to a change in the understanding of value *as such*.

It is easy to dismiss the Castalian attitude to religion as a mere consequence of its explicit fidelity to the Enlightenment, but the Castalian attitude to art indicates an implicit fidelity to an entirely different historical moment—the End of History, the teleological plateau in the evolution of our collective self-consciousness articulated by Hegel across his various philosophical works.[3] Hegel is the philosopher most often invoked in the course of the novel.[4] He holds not only that the world is in truth Absolute Spirit—the unity of Absolute Idea (God) and its self-externalization (Nature)—and that world history is the process through which Spirit (as Culture) realizes itself (as Freedom) by achieving progressively greater self-consciousness, but that self-consciousness of this very truth is progressively manifest in art, religion, and ultimately philosophy.[5] Hegel does not see the end of art or religion as the point at which they cannot be pursued any further and thus must be abandoned, but as the point at which their role as privileged forms of cultural self-consciousness has been subsumed by philosophy. Hegel's own philosophy marks the End of History by realizing this subsumption—constituting the foundation for all future progress in spiritual self-consciousness.

Hesse makes it quite clear that, for all its conceptual subtlety, the Glass Bead Game is not philosophy:

> *Philosophizing should be done only with legitimate tools, those of philosophy. Our Game is neither philosophy nor religion; it is a discipline of its own, in character most akin to art. It is an art* sui generis *[…] The philosopher Kant […] once said that theological philosophizing was "a magic lantern of chimeras." We should not make our Glass Bead Game into that.*[6]

This is sufficient to discourage us from seeing the Game as the symbol of Hegelian philosophy. Nevertheless, the manner in which Castalia realizes the ideal of comprehensive humanistic inquiry exemplifies Hegel's account of the historical trend towards increasing collective self-consciousness through the evolution of social institutions. The prohibition on artistic creation reflects the notion that art has nothing more to tell us about ourselves, restricting the role of artistic institutions to preserving

the memory of lessons already learned. The ascension of the Game reflects the notion that the true value of art (Beauty) lies in enabling self-consciousness—by expressing the Idea of Freedom in various forms (e.g., in the emotional range of song or the ethical conflicts of Greek tragedy)—insofar as the Game aims at this value more directly, by exploring the freedom of thought itself (e.g., exposing mathematical analogies between disparate themes or resolving tensions between conflicting concepts).[7]

For Hegelian and Castalian alike, the essence of our freedom is the capacity for rational thought (Reason), and it is therefore unsurprising that each seeks the highest consciousness of freedom in the pure exercise of this capacity—either *contemplating* the Absolute or *playing* the Game. Still, there are deeper connections between their conceptions of freedom. There is a long tradition in German philosophy that aims to overcome the perceived opposition between freedom and duty. This tradition has two interlocking components. The first, initially developed by Kant, is the idea that individual freedom consists not in the availability of options for action, but in the capacity for *rational self-determination*. This means the capacity to respond to reasons for action (e.g., moral duty) constrained by neither external authority (e.g., arbitrary political power) nor internal desire (e.g., arbitrary libidinal impulse). The second, skillfully elaborated by Hegel, is the idea that this freedom can nevertheless be realized through social institutions. This means that socially imposed constraints on some forms of action (e.g., taxes on personal spending) can simultaneously enable others (e.g., investment in shared services), and that the net result can be an overall increase in individual freedom. Together, these explain the exercise of legitimate authority as bound by a corresponding responsibility to fulfill some role within a social institution that realizes freedom.

Hegelian themes are thus clearly present in the understanding of *value* embodied by Castalia (and its Game) and the understanding of *freedom* embodied by the Order (and its hierarchy), but these are largely enveloped within the novel's engagement with the concept of *history*. According to Knecht, Castalians have "no confidence in that so-called philosophy of history of which Hegel is the most brilliant and most dangerous representative."[8] Yet this official rejection belies a deeper affinity manifest in the Castalian attitude to history, articulated by Knecht's Benedictine interlocutor Father Jacobus:

> *"You mathematicians and Glass Bead Game Players," he would say, "have distilled a kind of world history to suit your own tastes. It consists of nothing but the history of ideas and of art. Your history is bloodless and lacking in reality. [...] You treat world history as a mathematician does mathematics, in which nothing but laws and formulas exist, no reality, no good and evil, no time, no yesterday, no tomorrow, nothing but an eternal, shallow mathematical present."*[9]

Knecht's life as a student in Castalia and member of the Order serves to justify this assessment. Knecht comes to appreciate both the historical and political conditions of Castalia's existence *and* its systematic ignorance of these conditions. Castalians act as if their province is a *world-historical* achievement that cannot be undone—as if the history of societies mirrored the history of ideas, in which nothing is lost to the memory of scholars.

In becoming Magister Ludi, Knecht achieves a singular position in Castalian society, combining the highest authority and highest responsibility toward the symbol of its governing ideal: the Glass Bead Game. However, we should not assume that his eventual decision to abdicate his position is a straightforward rejection of this ideal. Knecht is in a better position to appreciate the value of Castalia and the Game than anyone, but he is also in a better position to appreciate their historical precariousness. He sees that the unique *nonutilitarian* value which makes the Game so precious is precisely what puts it in danger, and that treating it as the culmination of a teleological development incorporating science, art, and religion does nothing to assuage this danger.[10]

Knecht's break with the Hegelian conception of history thus forces him to reevaluate the conceptions of freedom and value lodged within it, but the result is more of a reorientation than a rejection.[11] This is best indicated by the quotation with which Knecht ends his circular letter:

> *Times of terror and deepest misery may be in the offing. But if any happiness at all is to be extracted from that misery, it can be only a spiritual happiness, looking backward toward the conservation of the culture of earlier times, looking forward toward serene and stalwart defense of the things of the spirit in an age which otherwise might succumb wholly to material things.*[12]

The life of the mind that the Game symbolizes retains its *unconditional* value (Beauty), but it must ever be practically subordinated to the *conditions* under which it can be realized (Right). This implies a new compact between Castalia's two roles, in which its pedagogical responsibilities toward the world beyond must be prioritized over its aesthetic devotion to thought for its own sake.

II. The Game of Games

Perhaps the most significant feature of the above interpretation is that the symbolic role of the Glass Bead Game has little to do with its status *as a game*. Of course, much of the Game's symbolic power derives from the fact that it is described obliquely, through various suggestive analogies and allusions, including its very name, which refers to its mathematical origins in the manipulation of special abacuses, rather than anything to do with its modern practice.[13] Despite many earnest attempts to devise rules by which the Game could be played in reality, none has come close to capturing the air of sublime mystery and intellectual subtlety that Hesse so deftly weaves about it.[14] Nevertheless, there is more to the Game *qua* game than is required for the symbolic role already described, and more to the core themes of freedom and value that can be revealed by disentangling them from the concept of history and connecting them to the concept of game.

Hesse provides an overview of the origins of the Game in the historians' introduction to Knecht's biography, and describes its general character and how it is played at various points throughout the book. The following passage is perhaps the most representative:

> *Under the shifting hegemony of now this, now that science or art, the Game of games had developed into a kind of universal language through which the players could express values and set these in relation to one another. Throughout its history the Game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. A Game, for example, might start from a given astronomical configuration, or from the actual theme of a Bach fugue, or from a sentence out of Leibniz or the Upanishads, and from this theme, depending on the intentions and talents of the player, it could either further explore and elaborate the initial motif or else enrich its expressiveness by allusions to kindred concepts.*[15]

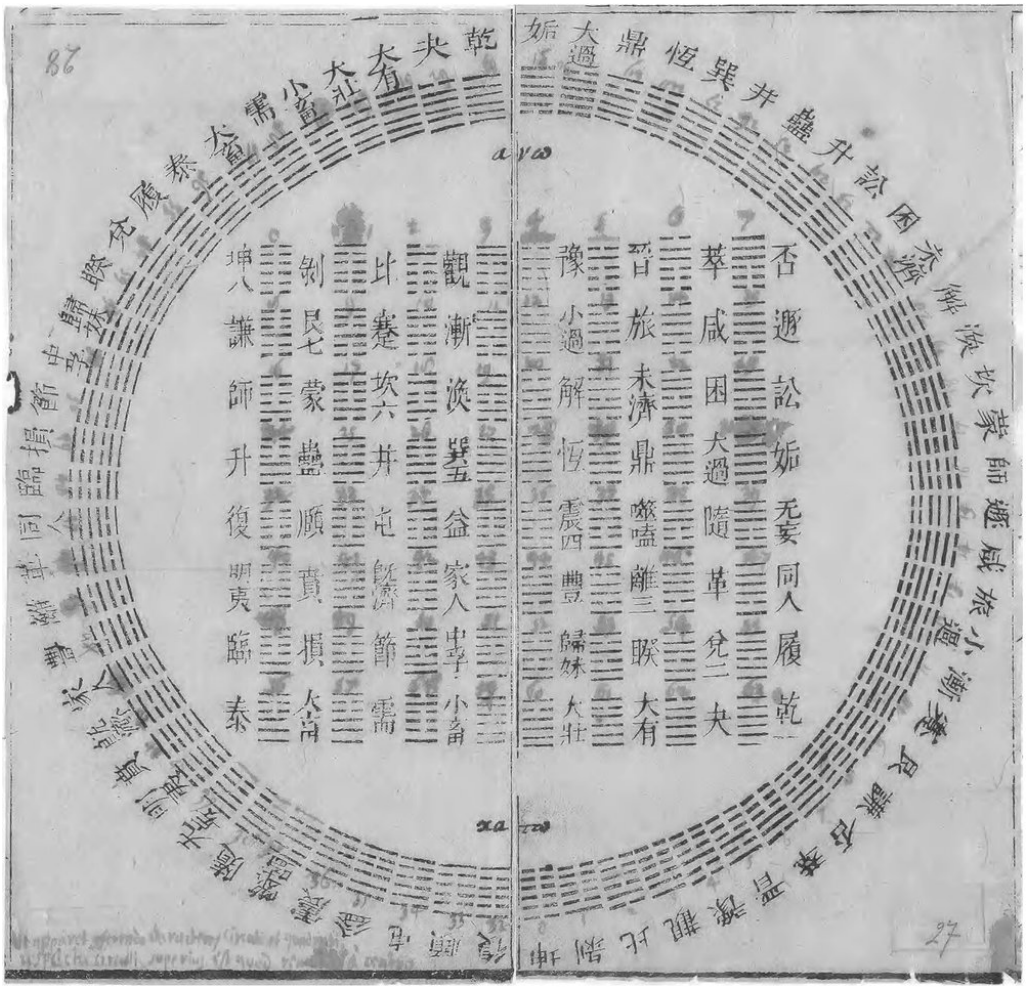


Diagram of i-ching hexagrams owned by Gottfried Wilhelm Leibniz

The heart of the Game is its *language*—an ideographic script comparable to Chinese—whose vast and scrupulously maintained lexicon enables it to communicate ideas from any discipline, and whose subtle yet mathematically precise syntax enables it to express correspondences between ideas across disciplinary boundaries.[16] This aspires in some ways to the notion of a *characteristica universalis* proposed by Leibniz. However, while it certainly realizes the encyclopedic ambition of Leibniz's proposal, it falls short of the corresponding logical ambition of a *calculus rationator*—a universal framework in which every dispute between competing intellectual positions can be resolved by means of demonstration. By contrast, the Game develops the affinity between mathematics and music into a *lingua sacra*—a sacred language in which every harmony, symmetry, or counterpoint between disparate themes can be represented as a pure aesthetic abstraction.[17] This opposition manifests an incipient tension between the *universitas litterarum* as a search for Truth, and the Game as a search for Beauty.

The selection of a given Game's themes and even something of their progression can be decided in advance, and Knecht spends much time in the novel composing and comparing such Games in private.[18] However, the Game proper is meant to be played in public, by a number of players, whose contributions to the way the themes unfold will distinguish it from any other Game based on the same themes,[19] and whose mutual cooperation can decisively determine the overall success of the Game.[20]

A. Two Threads in the Theory of Games

The concept of *play* was a significant concern of German philosophy, beginning with Kant's account of the free play of the faculties in the experience of Beauty, and developed in Schiller's account of the play-instinct as the essential unity of man's active and passive dimensions, before passing into psychoanalysis in Freud's theory of drives and hermeneutics in Gadamer's theory of art. However, this concern did not really extend to the concept of *game*, which only began to be theorized on its own terms during the writing of *The Glass Bead Game* (begun in 1933) and the decades following its publication (1946), in distinct fields: *mathematics* and *sociology*.

Mathematicians have been interested in games since the beginning of probability theory, but it was only in the early twentieth century that something like a general framework for studying games and proving theorems regarding them began to emerge, achieving explicit form in Jon von Neumann and Oskar Morgenstern's *Theory of Games and Economic Behavior* (1944) and full generality with John Nash's "Non-Cooperative Games" (1951). The *game theory* that emerged from these innovations is essentially the study of *interactive decision spaces* constituted by rules that fix the players' possible actions (e.g., the permissible movements of chess pieces), the relations between them (e.g., taking an opponent's piece limits their possible actions), and the goal states or *payoffs* they are presumed to aim at (e.g., checkmate). Such study delineates *strategies* for achieving specific goals under certain conditions (e.g., ensuring checkmate given a particular endgame configuration), which choose plays, or paths through the decision space, in response to the actions of other players. The limit-case of this is a *winning strategy*, which guarantees the desired outcome no matter how the other players act. These strategies only exist in so called deterministic games (e.g., chess, checkers, etc.), and even then only some of these games are tractable enough to have been *solved* (e.g., tic-tac-toe).

The contrast between deterministic and nondeterministic games is only one aspect of the rich taxonomy that game theory has developed since its inception, incorporating distinctions between types of action (e.g., simultaneous/sequential, discrete/differential,

and finite/infinite), types of payoff (e.g., cooperative/competitive, zero-sum/open-sum), and types of information (e.g., perfect/imperfect and complete/incomplete). However, this taxonomy includes many activities that we would not usually describe as games (e.g., purchasing negotiations, the prisoners dilemma, nuclear war), and excludes many activities we would so describe (e.g., playing with dolls, word association, Dungeons and Dragons). Moreover, many nondeterministic games included in the taxonomy partially resist strategic analysis (e.g., baseball), insofar as the *actions* they involve cannot simply be reduced to *decisions* (i.e., one does not simply *decide* to hit a home run). Stochastic games such as backgammon are both nondeterministic and completely captured by game theory, insofar as the uncertainty they involve is strictly *circumscribed* by the rules (even if it is *realized* by rolling dice, shuffling cards, or computerized random number generation). By contrast, the uncertainty involved in baseball, competitive martial arts, or a scavenger hunt is only *mediated* by the rules, insofar as they incorporate elements of the world into the game (e.g., equipment, players, locales). This extrinsic uncertainty must then be folded back into game theory by incorporating independent causal and statistical analysis of these elements (e.g., hitting mechanics and sabermetrics).

Go players, published in *Miscellanea Berolinensia* 1710.

The foundational text in the sociology of games is Johan Huizinga's *Homo Ludens* (begun in 1933 and published in 1938).[21] Huizinga does not really present a theory of games as a distinct form of activity, but rather aims to provide a theory of play as the root of all culture, expressed in everything from law and language to war and religion. He defines play as an activity that displays four connected features: *freedom* of action, *independence* from ordinary life, *delimitation* in space and time, and *governance* by fixed rules.[22] Play thus tends to be parceled out into discrete activities, which become games or rituals as the limits/rules that separate them from ordinary life are formalized:

> *The arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart.*[23]

Although Huizinga agrees with Schiller that the play-instinct is an essential feature of humanity, he does not think it is unique to humans. He sees the same "irrational" drive at work in the behavior of kittens and chess masters.[24] The reason we are properly designated *homo ludens* (rather than *homo sapiens* or *homo faber*) is that this drive animates us to create and maintain these "temporary worlds within the ordinary world" to a degree found nowhere else in nature, resulting in the evolving networks of semi-autonomous social practices that constitute our cultures.

Huizinga's failure to adequately define 'game' inspired Roger Caillois to provide the first comprehensive account of the concept in *Man, Play, and Games* (1958).[25] Caillois claims that Huizinga's definition of play equally includes activities that aren't games (e.g., religious ritual, legal debate, poetic composition) and excludes activities that are (i.e. noncompetitive games and gambling for profit).[26] However, he aims to revise rather than reject Huizinga's "magic circle" approach.[27] He agrees with Huizinga that games are essentially *free* from obligation, and *separate* in space and time. He thinks that they are less independent than *unproductive*, contributing nothing new to ordinary life, but permitting redistribution of resources amongst players (as in gambling). He also thinks that while games necessarily involve players and things taking on roles (e.g., white/pawn, pitcher/base, astronaut/spaceship), this can take the form of *governance* by rules or *make-believe*. His distinctive innovation is to insist that the outcomes of games are essentially *uncertain*. These six common features give way to a comprehensive taxonomy of games, organized around four fundamental categories:

> *I am proposing a division into four main rubrics, depending on whether, in the games under consideration, the role of competition, chance, simulation, or vertigo is dominant. I call these* agôn, alea, mimicry, *and* ilinx*, respectively. All four indeed belong to the domain of play. One* plays *football, billiards, or chess* (agôn)*; roulette or a lottery* (alea)*; pirate, Nero, or Hamlet* (mimicry)*; or one produces in oneself, by a rapid whirling or failing movement, a state of dizziness and disorder* (ilinx)*.*[28]

Caillois thinks that some combinations of these categories are permissible, such as the perennial pairing of *agôn* with *alea* (e.g., backgammon, poker, etc.), but that others are incompatible, such as *agon* with *ilinx* and *alea* with *mimicry*. Furthermore, he proposes "a continuum between two opposite poles" along which the games in each category can be arrayed, representing the conflict between *paidia*—the "frolicsome and impulsive exuberance" associated with free improvisation and the unstructured play of animals and children—and *ludus*—the countervailing "tendency to bind [*paidia*] with arbitrary, imperative, and purposely tedious conventions" associated with the formalized games of

adults.[29] Caillois presents this disciplining of *paidia* by *ludus* as the historical process through which the categories have come into their own as specific forms of play (e.g., sport, gambling, theatre), and begotten corresponding forms of culture (e.g., educational competition, economic speculation, political ceremony); though *ilinx* is distinguished primarily by its resistance these developments.[30]

B. The Reason in Games

Having introduced these traditions, we can now identify an important tension between their approaches to the concepts of uncertainty and rationality. It is best to see Caillois's emphasis on the *uncertainty* of outcomes as a development of Huizinga's emphasis on the *freedom* of players. If this freedom is to be more than the availability of options (e.g., the choice of tokens in Monopoly: boot, dog, etc.), then the game must suggest reasons for choosing between courses of action (e.g., defeating an opponent, scoring points, or playing elegantly); but if these reasons are to be something other than further restrictions imposed by the rules, then the courses of action they prescribe must be uncertain. This argument reveals the paradox of game theory—its tendency to minimize the uncertainty of the games it studies, effectively eliminating it in deterministic games. However, the above argument also reveals a commitment to something like rational self-determination implicit in adherence to "the spirit of the game" at odds with Huizinga's claim that play is "irrational" and Caillois's account of *paidia*. If we look more carefully at Caillois's account, he says that a game "consists of the need to find or continue at once a response which is free within the limits set by the rules."[31] This distinction between the *need* motivating the response and the *rules* limiting its form is obscured in the opposition between *paidia* and *ludus*, insofar as the latter ignores the difference between formalizing motivations *for* action and formalizing limitations *upon* action. The overall effect of this is that the absence of constraint characteristic of *paidia* becomes associated with the presence of spontaneity, wherein the *specific* motivations of play (e.g., the kitten's hunting practice, the child's sense-making of adult behavior, etc.) are subsumed by a *general* creative drive (i.e., the will to experiment, the artistic impulse, etc.). The opposition between *paidia* and *ludus* is thus framed as a conflict between irrationality, creativity, and freedom, on the one hand, and rationality, strategy, and law, on the other. It is tempting to acquiesce to this framing, if only to position game theory's paradoxical tendency to "break" games as the pyrrhic victory of *ludic rationality* over *paidaic irrationality*, but this would mean abandoning the rational motivation implicit in

"the spirit" of games that makes sense of their essential uncertainty. It would permit trivial uncertainty, consisting in the unpredictability of the player's moves rather than their consequences.

We should rather see game theory as capturing only some of the motivations at work in games—those that can be precisely modeled by payoff functions and preference rankings—and thus as providing a truncated theory of rationality. Games with strictly formalized rules can incorporate surprisingly subtle systems of motivation, from goals that incorporate the uncertainties of the world (e.g., competitions to design better bridges) to *values* that shape the evolution of preferences (e.g., collaborative composition of beautiful narratives). Combined with the incredible ingenuity displayed by the master strategists of the ludic arts (e.g., chess masters, *Magic: The Gathering*™ champions, etc.), this is sufficient to demolish the idea that creativity is somehow opposed to rationality—it is not a singular wellspring of novelty opposed to the concrete diversity of purpose. We have seen that the Glass Bead Game symbolizes many things, but its hyperbolic synthesis of ludicism and aestheticism makes it the perfect emblem of this rapprochement of reason and creativity. It not only represents the conceptual relation between freedom and value contained in Reason—it presents a *speculative vector* along which to explore this relation in the domain of games and play. However, traversing this vector requires delving deeper into the dynamics of the game, thus passing from the reason in games to the games in reason…

Footnotes

1. Hermann Hesse. *The Glass Bead Game*. London: Picador Classics, 1987. 16. Print.

2. Ibid [*GBG*]. 27. The exception to this ban on creation are the fictional 'lives' that each student is supposed to compose during their years of free study.

3. I would identify the *Science of Logic* and *Lectures on the History of Philosophy*, the *Philosophy of Right* and *Lectures on the Philosophy of History*, and the *Lectures on Aesthetics* and *Lectures on the Philosophy of Religion* as covering the important intellectual, political, and cultural elements of this thesis, respectively.

4. *GBG*. 16, 40, 81, 91, 122, 227, 351-352, 445.

5. G.W.F. Hegel. *Aesthetics: Lectures on Fine Art*. Trans. T.M. Knox. Oxford: Oxford University Press, 1975. Part I: Introduction, 91-105. Print.

6. *GBG*. 141.

7. At one point, Knecht even comes close to describing the Game as consciousness of the Absolute (*GBG*. 121): "For the dark interior, the esoterics of the Game, points down into the One and All, into those depths where the eternal Atman eternally breathes in and out, sufficient unto itself."

8. *GBG*. 351. It is significant to note that Hesse based the character of Father Jacobus on the cultural historian and noted critique of Hegel's philosophy of history, Jacob Burckhardt (see Ziolkowski).

9. *GBG*. 168.

10. *GBG*. 360-362.

11. This reflects Hesse's own reorientation in the course of writing the novel, from depicting a seeming utopia to criticizing the principles underlying it (see Ziolkowski).

12. *GBG*. 363. As Ziolkoswki points out (59), this is in fact a direct quotation from Burckhardt's "The Revolutionary Age."

13. *GBG*. 31-32.

14. These attempts are catalogued in a wiki entry. Web. 19 October 2015. http://www.ludism.org/gbgwiki/HomePage

15. *GBG*. 39-40.

16. *GBG*. 14-15, 36-37.

17. *GBG*. 118-121.

18. See *GBG*. 195-202.

19. *GBG*. 14-15.

20. This is demonstrated by the disastrous Game planned by Thomas van der Trave but led by Bertram, the previous Magister Ludi's shadow, which is deliberately ruined by the elite players as a snub to Bertram (*GBG*. 210-216).

21. Johan Huizinga. *Homo Ludens: A Study of the Play Element in Culture*. London: Routledge & Kegan Paul, 1949. Print.

22. *Ibid*. 8-11.

23. *Ibid*. 10.

24. *Ibid*. 4.

25. Roger Caillois. *Man, Play, and Games.* Trans. Meyer Barash. Champaign: University of Illinois Press, 2001. Print.

26. *Ibid*. 3-5.

27. *Ibid*. 5-10.

28. *Ibid*. 12.

29. Caillois. 13-14.

30. *Ibid*. 27-33, 36, 54.

31. *Ibid*. 8. Emphasis altered

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Melting Glass Beads—The Multiverse Game of Gestures and Strings

Guerino Mazzola

Review of Hesse's Glass Bead Game

Hermann Hesse published his novel *Das Glasperlenspiel* (1943) in Zurich[1] and went on to receive the Nobel Prize in Literature in 1946. Hesse commented on the novel's substance, "It (the glass bead game) represented a symbolic form of seeking for perfection, an approach to that Mind which beyond all images and multiplicities is one within itself—in other words, to God."[2] There is no precise description of this glass bead game, but one passage describes to some degree what the game is about:

> *Under the shifting hegemony of now this, now that science or art, the game of games had developed into a kind of universal language through which the players could express values and set these in relation to one another. Throughout its history the game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. A game, for example, might start from a given astronomical configuration, or from the actual theme of a Bach fugue, or from a sentence out of Leibniz or the Upanishads, and from this theme, depending on the intentions and talents of the player, it could either further explore and elaborate the initial motif or else enrich its expressiveness by allusions to kindred concepts. Beginners learned how to establish parallels, by means of the game's symbols, between a piece of classical music and the formula for some law of nature. Experts and masters of the game freely move the initial theme into unlimited combinations.*[3]

The combination of mathematics and music was inspired by the work of music theorist Hans Kayser (1891-1964), who also lived in Switzerland when Hesse was creating his novel and whose work is a Neo-pythagorean mathematical theory of music.[4]

Frozen Glass Beads of Facticity

Hesse's approach is clearly interdisciplinary. The technical character of the game, although not explicated in detail, is a combinatorial one. This follows from Hesse's enthusiasm for the famous Chinese *I Ching*, that yarrow stalk oracle and cosmology which results from the $64 = 2^6$ combinations of six broken or unbroken lines (represented by yarrow stalks). This combinatorial cosmology gives the user a corresponding number of cosmological treads. It is not creative, but strictly selective. Hesse's combinatorial perspective is also evident from his enthusiasm for Gottfried Wilhelm Leibniz's calculus of logic, that idea of a perfect language where its conversations would be reduced to an exchange of formal logical formulas.[5]

This approach to reality as a combinatorial setup that can be controlled by formal logical calculus is the ontology we know from Ludwig Wittgenstein's *tractatus logico-philosophicus,*[6] the first sentence of which reads, *"Die Welt is alles, was der Fall ist"* ("The world is everything that is the case"). This point of view is utterly reductionist. "What is the case" means *what has been made and is there now*. Once, forever? And who made it, and how? This does not matter. It is a perspective on existence as a collection of frozen objects. Take it or leave it, but you are only the user, much as in the medieval cosmology where humans could just observe God's world without any option of active

intervention. A recent book[7] confirms this view, describing a computer program that implements those combinatorial options in the spirit of *I Ching* and Leibniz. Hesse also stresses that his glass bead game is a search for God, that hidden universal spirit which connects all those diversities at the phenomenal surface.

In this style, Hesse's *Glass Bead Game* idea was realized through my own work in mathematical music theory in 1985.[8] However, it is not a neo-Pythagorean theory, but relies on modern mathematics (such as module theory, category theory, and algebraic topology). I wish to give a short overview of this work in order to demonstrate both its power and the fundamental limitations of the combinatorial method.

My approach started with Beethoven's famous *Hammerklavier* sonata, op. 106, and applied mathematical models of tonal modulation and paradigmatic classification of melodies (the latter in the spirit of Jean-Jacques Nattiez)[9] to a thorough analysis of Beethoven's harmonic and motivic construction. In the vein of Hesse's sketch of the game, I derived a mathematical formula that would describe his musical operations. This formula is the symmetry group $\mathrm{Sym}(C\#_{-7})$ of the diminished seventh chord $C\#_{-7} = \{c\#, e, g, a\#\}$. For the composition of a new sonata, we then exchanged this chord with an equally famous combination of pitches, the augmented triad $C\#_{+} = \{c\#, f, a\}$, and then used its symmetry group $\mathrm{Sym}(C\#_{+})$ to construe all modulations and the motivic germs of the new sonata. In other words, I threw the mathematical formula back into the musical realm. The resulting sonata *L'essence du bleu* has been published and released on CD.[10]

The result could appear to be a real product of creativity. But it is simply a restatement of Beethoven's thoughts (viewed through the microscope of our mathematical analysis) with changes of corresponding structures, *mutatis mutandis*. I don't qualify this type of game as a truly creative one. There is no box whose walls are being opened into an unknown space outside; rather we are opening the door leading from one box (music) to the neighboring box (mathematics).

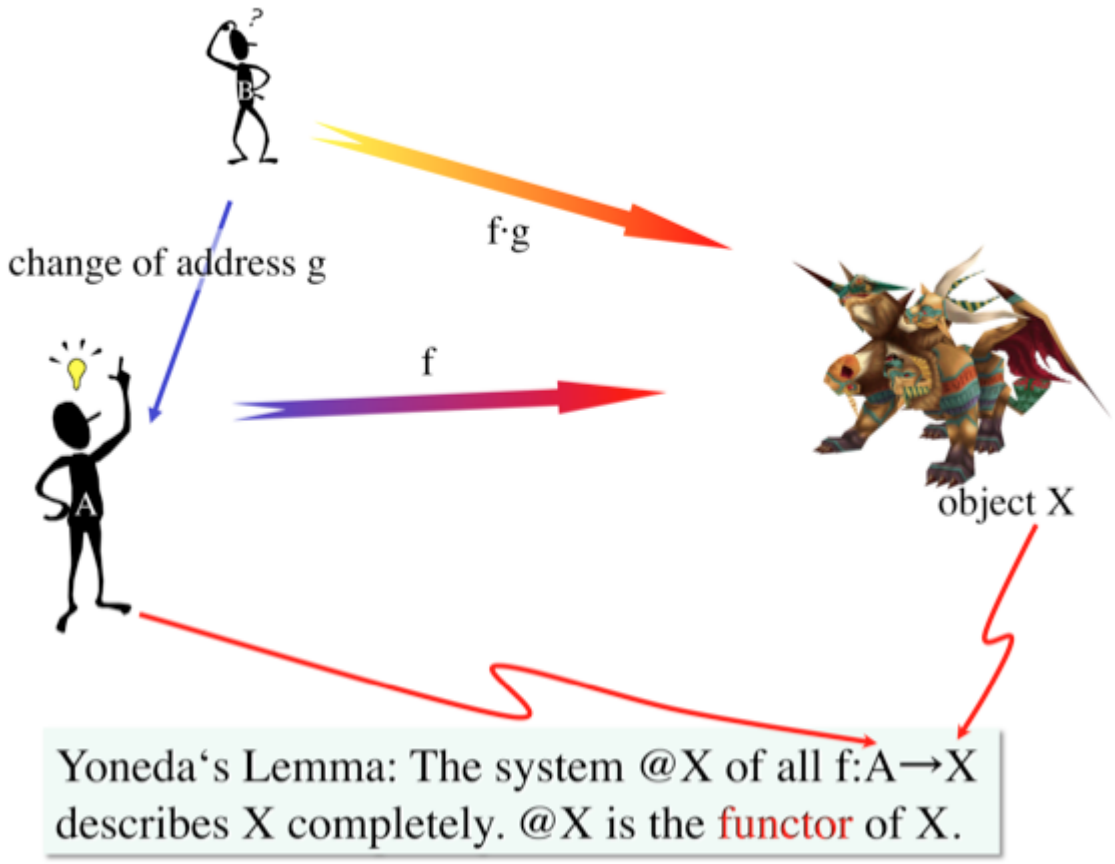
In what follows I shall explain how and in which domains of creative knowledge production Hesse's Glass Bead Game can be morphed into a less passive, factual, and rigid activity.

The Revolution of Functors

A first conceptual revolution occurred in the new mathematics introduced by Samuel Eilenberg and Sounders Mac Lane with their theory of categories in 1945.[11] They analyzed the basic objects of mathematics, namely points—those objects that have no parts according to the classical approach by Euclid: *punctus est cuius pars nulla est*. For

categories, points were replaced by new elementary objects: arrows. Category theorists considered points as a result of a pointer action; "punctus" is the result or head of an arrow that pricks its target. The new concept of an arrow has three parts: its head and its tail, which are connected by a shaft symbolizing a pricking movement from tail to head. This seemingly harmless change introduced not just its pricked result, but the point of departure for a conceptual movement.

With this dramatic change, the subject (an arrow's point of departure) was introduced and thereby the inclusion of the point of view or "address" from which the target point was addressed. In Alexander Grothendieck's (1928-2014) algebraic geometry,[12] this paradigmatic revolution introduced a completely new conceptualization, a kind of relativity theory in geometry. This theory eventually led to the solution of hard problems, such as the Weil and Fermat conjectures, by Pierre Deligne (1974) and Andrew Wyles (1995), respectively.



Yoneda's Lemma replaces "whatness" by "suchness (Guerino Mazzola)

The big program was therefore to understand algebraic geometry as a science of relative points. The strongest general argument for this revolution was a simple, but powerful lemma, a result introduced by the Japanese computer scientist Nobuo Yoneda in 1954. He could prove that a space X can be completely described by its functor, i.e., by the system of all arrows f: A —> X where the address A runs over all possible choices. This functor, which we denote as @X replaces the space X as such by its system of variable arrows. More precisely, the lemma states that two spaces X, Y are isomorphic if and only if their functors @X and @Y are isomorphic as functors.

This result allows mathematicians to replace spaces (and in fact any objects of general categories) by their functors. In other words, the spaces *qua* objects with their intrinsic identity are replaced by their functors, which are systems of relative behavioral perspectives from variable addresses. In philosophical terms: the "whatness" of X is replaced by the "suchness" of the functorial entities @X. Mathematics is no longer interested in the abstract identities X but only in their behavioral systems, the functors @X.

This revolution generated a new paradigm of conceptual manipulation: Abstract spaces became only relevant via their behavior under specific but arbitrarily variable addresses. This means that a mathematical object could now be conceived as a distributed behavior, its identity reified as a collaborative system of addressed perspectives. With respect to Hesse's original God-oriented approach, we now see that divine whatness being replaced by a "God-functor" that is realized in its (not necessarily representable) howness, and which our collaboration in a distributed identity experiences.

In mathematical music theory, I have composed a piece which is actually a recomposition of Pierre Boulez's *structures pour deux pianos I*, following the functorial methodology[13] and applying Boulez's idea of a creative analysis. My analysis of Boulez's original composition followed György Ligeti's analysis[14] which we reinterpreted as being a functorial procedure. Of course, Boulez did not know category theory when he composed that piece, but in the light of Yoneda's lemma, his compositional strategy was in perfect congruence with modern functorial methods. I then implemented the functorial analysis in the rubato composer software and was able to recompose new variants of that piece by canonical address changes.[15] It is not an exaggeration to understand Boulez's structures as *the historically first genuinely functorial composition*.

Gestures in Philosophy and Science

This revolution generated a new paradigm of conceptual manipulation: Abstract spaces became only relevant via their behavior under specific but arbitrarily variable addresses. This means that a mathematical object could now be conceived as a distributed behavior, its identity reified as a collaborative system of addressed perspectives. With respect to Hesse's original God-oriented approach, we now see that divine whatness being replaced by a "God-functor" that is realized in its (not necessarily representable) howness, and which our collaboration in a distributed identity experiences.[16] A function is similar to an industrial plant: Input – Black Box – Output. As the great mathematician Henri Poincaré stated,

> *To localize an object simply means to represent to oneself the movements that would be necessary to reach it.*[17]

He was aware that the gestural origin of geometry is beyond the formal mathematical mechanisms known at his time.

Let us clarify the radical abstraction from movements in mathematical formulas. Take a rotation in real three-space. This movement of the space's point around an axis is represented by a 3×3 matrix M in linear algebra. But the matrix M does not show any information about the axis or the rotation's angle. You have to work quite hard to exhibit such an axis from M. The catchword is eigenvalues, and there are corresponding eigenvectors (that could play the role of rotational axes); the rotation's angle—if an eigenvector of a rotation can be found at all—is yet another problem to be solved by linear algebra. In other words: The mathematical representation of movements by matrices is a radical abstraction, a compactification of a movement in a formula, a kind of Fregean prison, where the original movement has been encapsulated. If we were to relate music to mathematics we could state here that they relate formulas to gestures, but in opposite directions: While mathematics compactifies gestures into formulas, music unfolds formulas into gestures.

Let us now focus on the gestural ontology which has thus far been hidden in contemporary functorial mathematics. For an excellent treatise on the history of gestures in European philosophy, we refer to Jean-Claude Schmitt's, *La raison des gestes dans l'Occident médiéval.*[18] He has given the most complete and important contribution to a history of the concept, philosophy, social and religious role of gestures during the early centuries of our modern Western culture. He exhibits the first (and still one of the best) definitions of a gesture, set forth by Paris-based theologist Hugues de Saint-Victor

(1096-1141):[19] "*Gestus est motus et figuratio membrorum corporis, ad omnem agendi et habendi modum*" ("Gesture is the movement and figuration of the body's limbs with an aim, but also according to the measure and modality proper to the achievement of all action and attitude.") Observe that in Saint-Victor's definition, the specification *ad omnem agendi et habendi modum* is not semiotic, but merely describes the generic modality of action and being.

A gesture is a pre-semiotic concept; it does not automatically mean anything. The pointer gesture is also pre-semiotic since Saussurean structuralist semiotics is built upon the pointer from signifier to signified. A pointer is not a sign, but a "prequisite" to any semiotic concept architecture.

In the twentieth century, gesture philosophy was above all developed by French philosophers, linguists, and mathematicians. Their works also differ from the Anglo-Saxon linguistic philosophy of gestures that was developed by Adam Kendon and David McNeil.[21] [22] They focus on gestures that are co-present in linguistic utterances, and in this perspective, their concept of a gesture is strictly semiotic: Gestures are special signs that support the building of linguistic syntagms and contents. And they are always related to the body's actions; no more abstract concept of a gesture, such as a gesture in a musical melody or a thought gesture, is addressed. We shall not go into this rather restrictive conceptual line in more detail, and refer the reader to a forthcoming book[23] for further information.

The French tradition of gesture philosophy is characterized by the thesis that gestures constitute a proper ontology that is independent of, and typically precedes, semiotic systems; gesture is pre-semiotic.

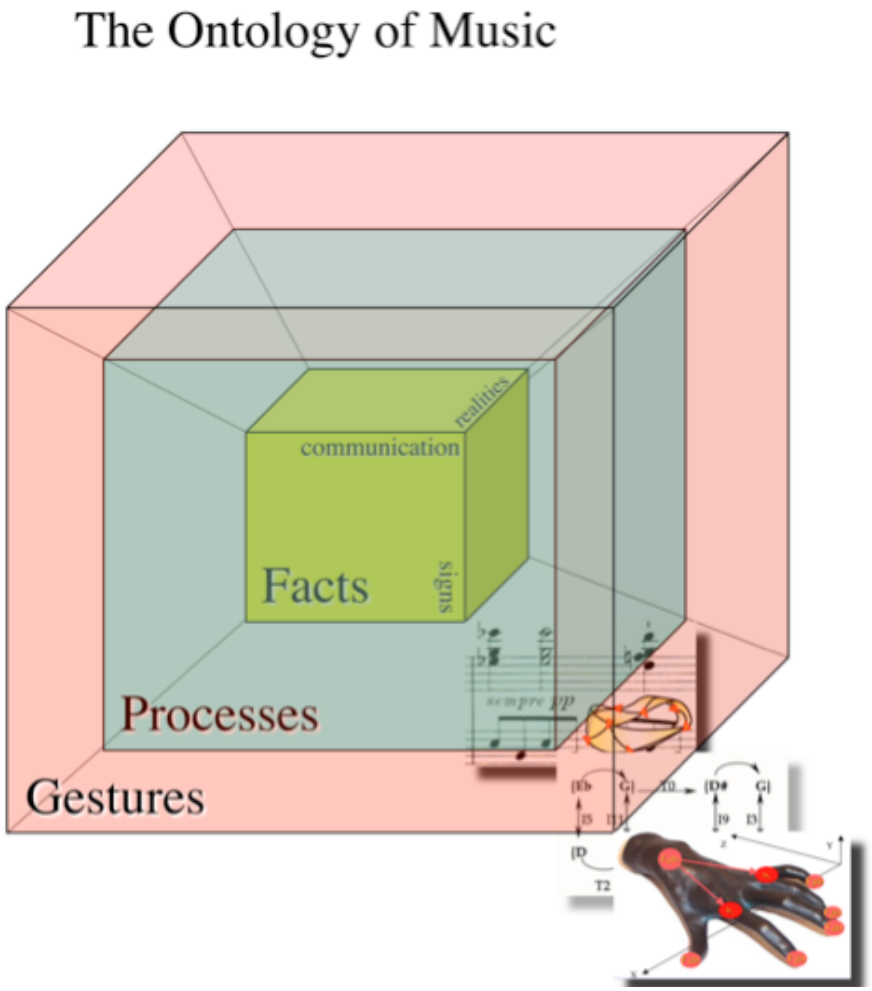
Ahead of his time, French mathematician and philosopher Jean Cavaillès in 1938 stated a core property of gestures that bypasses any semiotic basis: "Understanding is catching the gesture and being able to continue."[24]

In a remarkable series of interviews,[25] the painter Francis Bacon made clear that his diagrammatic gestures were more important to his creative work than mentally planned strategies: "The marks are made, and you survey the thing like you would a sort of graph. And you see within this graph the possibilities of all types of fact being planted." These insights inspired the French school of diagrammatic philosophers, led by Gilles Deleuze's comments on Bacon.[26] His ideas were then developed and deepened by gesture theorists and philosophers, such as Gilles Châtelet[27] and Charles Alunni.[28]

Cavaillès' dancing thought (also shaped in Pierre Boulez's reflection on gesture in music)[29] was in fact stated with respect to mathematical theories, and as such it was one of the very first principles of gestural embodiment in mathematics, an idea now quite

fashionable through the work of George Lakoff and Rafael Núñez,[30] but also anticipated in Châtelet's observation that the Fregean concept of a function in mathematics is a dramatic (and questionable) abstraction.[31]

Gestures—except when "tamed" by social codes—are not signs in a semiotic environment. They are not a realization of Ferdinand de Saussure's classical signification process. Châtelet is very clear on this point: "The concept of a gesture seems crucial to approach the amplifying movement of abstraction in mathematics. (…) A diagram can immobilize a gesture, put it to rest long before it is hidden in a sign, this is why geometers and contemporary cosmologists love diagrams and their power of preemptive evocation."[32] A gesture can be immobilized by a diagram (which in this French theory is a kind of disembodied gesture) before it becomes a sign. And Alunni confirms this creative pre-semiotic role of gestures: "It is not the rule which governs diagrammatic action but it is action which causes the rule to emerge."[33]



The Ontology of Music (Guerino Mazzola).

Musical ontology requires a fourth dimension of embodiment comprising facts, processes, and gestures. This one is added to the three classical dimensions of signs, realities, and communication.

In short, we learn that gestures are generally understood as pertaining to a proper ontology that is not subordinate to semiotic lines of thought. In particular, the dominant French diagrammatic philosophy exhibits a sharp dichotomy between "wild" and "tamed" gestures, the former being independent or antecedent of semiotic realms, while the latter serve semiotic purposes as special types of signs. Conceptual creativity is exhibited in the layer of wild gestures. The communicative characteristic of (wild) gestures stresses their "howness" as opposed to their substantial "whatness." Gestures are understood in their behavior, not in their absolute being (such as Kant's thing-in-itself [*Ding an sich*]).

It is astonishing that despite the sensational success of Grothendieck's "mathematical relativity theory," there has been some work in the direction of replacing abstract Fregean functions and their formalism in category theory by gestural concepts. In *Categorical Gestures,*[34] I have started an investigation of the possibility of enriching Yoneda's lemma with gestures, and the ultimate goal would be to replace the present abstract foundational entities of mathematics, such as sets or arrows, with gestures.

In an extraordinary interview with the Notices of the American Mathematical Society, the prominent mathematician Yuri Manin states his vision of future foundations of mathematics:

Instead of sets, clouds or discrete elements, we envisage some sort of vague spaces, which can be very severely deformed, mapped one to another, and all that while the specific space is not important, but only the space up to deformation. If we really want to return to discrete objects, we see continuous components, the pieces whose form or even dimension does not matter.…I am pretty strongly convinced that there is an ongoing reversal in the collective consciousness of mathematicians: the right hemispherical and homotopical picture of the world becomes the basic intuition, and if you want to get the discrete set, then you pass to the set of connected components of a space defined only up to homotopy.…That is, the Cantor points become continuous components, or attractors, and so on—almost from the start. Cantor's problems of the infinite recede to the background: from the very start, our images are so infinite that if you want to make something finite out of them, you must divide them by another infinity.…I see in this an analogy with the rebuilding of pragmatic foundations in terms of a category theory and homotopic topology.[35]

Gesture Theory in Music

In music philosophy, music theory, and performance research, gestures have played a role of conceptual enrichment for a long time, but a full-fledged theory of musical gestures has still not been forthcoming, probably also because of the difficulty of an epistemologically valid conceptualization of gestures. Let us give a summary of some important gestural perspectives in the science and art of music.

Already in Eduard Hanslick's determination of musical content as "*tönend bewegte Formen*,"[36] (not just forms, but forms that are moved in a sounding manner, or moved in sound for short) the formal aspect, the formula, of a cadence, for example, is not sufficient to generate content. The form(ula) needs to be moved; it is deployed in a gestural dynamics. Hanslick illustrates his idea with the kaleidoscope, a dynamical arrangement of forms that receive their aesthetical value in a self-referential internal relationship.

In the twentieth century, German music theorist Wolfgang Graeser applied the mathematical theory of symmetry groups to restructure Bach's *The Art of Fugue*, but while observing dancers who interpreted Bach's *Goldberg Variations*, switched from abstract symmetries to what he called "Körpersinn," the sense of embodiment in music.[37] His book project on this topic could not be brought to fruition as Graeser felt completely alienated by such advanced ideas and committed suicide in 1928 at the age of 22.

In the theory of musical performance, Theodor Wiesengrund Adorno in 1946 wrote an essay on performance which set forth strong arguments for the gestural essence in performance. He followed Paul Valéry's famous dictum: "*C'est l'exécution du poème qui est le poème*." In this essay, Adorno asserts that "the idea of performance pertains to music as such and isn't an accidental attribute." His analysis of the gestural basis of performance is as follows: "Correspondingly the task of the interpreter would be to consider the notes until they are transformed into original manuscripts under the insistent eye of the observer; however not as images of the author's emotion—they are also such, but only accidentally—but as the seismographic curves, which the body has left to the music in its gestural vibrations."[38] Adorno argues for what I have called "the score as a repertory of frozen gestures." He does not suggest that gestures have an emotional message; rather, he defends their nature as "vibrating" bodily utterances. At first sight, this may look overly materialistic and far from the symbolic meaning of musical creation, but Adorno insinuates a spiritual component in the gestural dynamics. This perspective is in fact supported by the very history of score notation. Originally, scores encoded the gestural

hints in the graphemes of Medieval neumes. These graphemes then successively morphed to the present notation, which has abstracted neumatic threads to discrete point symbols.

Adorno's student Renate Wieland and her fellow scholar Jürgen Uhde clarify their teacher's approach and apply it to their system of piano performance.[39] Wieland says: "Originally affects were actions, related to an exterior object, along the process of internalization they were detached from their object, but they are still determined by the coordinates of space….There is therefore something like gestural (space) coordinates." She makes it clear that gestures are abstractions from concrete actions which, however, remain geometric entities in some more generic space. Wieland also argues that the emotional connotation in music originally is e-motion, out-movement, and so the gestural transmutation is not an artificial construct, but the restatement of the original phenomenon.

American composer and music critic Roger Sessions has offered this beautifully clear description of the crucial but still underestimated role of gestures in performance:

> What I am saying is that we experience music as a pattern of movement, as a gesture; and that a gesture gradually loses its meaning for us insofar as we become aware of having witnessed it, in its total identity, before. If it is to retain this meaning in its full force, it must be on each occasion reinvested with fresh energy. Otherwise we experience it, to an increasing degree, as static; its impact, as movement, diminishes, and in the end we cease to experience it as movement at all. Its essentially static nature has imposed itself on our awareness….Each performance is a new one, and the work is always studied and approached anew, even by the composer. The same, it should be obvious, is true of professional performers. I would go even much further and point out that there is no such thing as a "definitive" performance of any work whatever.[40]

On the level of music performance in technology, Manfred Clynes with his sentograph, and Johan Sundberg and McAgnus Todd with their performance software and gesture-driven concepts of the final retard in music, state in particular that "the performance and perception of tempo/musical dynamics is based on an internal sense of motion." Similar approaches to cognitive models of gestures in music are shared by Marcelo Wanderley, Claude Cadoz, and Marc Leman.[41]

Coming from a different angle, namely music theory, the great American music theorist David Lewin introduced the gestural perspective in his seminal 1987 book,[42] or almost, as the theory and the textual representation are in fact more complex. Lewin's book describes what is now called "transformational theory," later adapted by his student

Henry Klumpenhouwer to become K-nets. Such networks replace an "amorphous" set of tone objects by a diagram, where the tone objects are placed in diagram's vertices, while the diagram's arrows designate (affine) transformations mapping tone objects into each other.

Lewin argues against what he calls "Cartesian thinking," which observes musical objects as *res extensae*. Opposed to this passive attitude, Lewin suggests that transformations between musical points (such as pitch classes, for example) are the new path to pursue. In *Generalized Musical Intervals and Transformations*, we read: "If I am at *s* and wish to get to *t*, what characteristic gesture should I perform in order to arrive there?" Now, this language sounds very gestural, but is based on different mathematical principles. Let us clarify this subtle mathematical point, which may escape the nonprofessional. Lewin's theory uses classical transformations and then, in Klumpenhouwer's networks, diagrams of transformations. Diagrams are systems of transformations between a set of spaces, and they relate points in those spaces by determined transformations. But they are not identical with the point systems generated by the so-called mathematical limit construction. An intuitive, and incidentally mathematically correct, way of characterizing diagrams is as generalized equations, whereas the objects from the limits are solutions of such equations. So the diagrams play the role of industrial plants, producing facts ("factum," what is made), namely Klumpenhouwer's K-nets. So the Lewinian digression from Cartesian facticity (or extensionality) is the step to mathematical processes, but not to gestures.

Lewin's formalism and his wording are different, but they show what his objective is: a gestural theory of music. It would be very interesting to investigate Lewin's text with the subtext of gestural thinking in mind, since he repeatedly uses this metaphor in a speaking way. Relating to his question about the movement of *s* to *t*, he adds: "This attitude is by and large the attitude of someone *inside* the music, as idealized dancer and/or singer. No external observer (analyst, listener) is needed."

This is a remarkable statement, which leads to the question set forth by music theorist Robert S. Hatten in his book with the now explicitly gesture-related title *Interpreting Musical Gestures, Topics, and Tropes*:[43] "Given the importance of gesture to interpretation, why do we not have a comprehensive theory of gesture in music?" For Hatten, gesturality became a core topic when he learned that performance of classical piano music—Mozart, Beethoven, Schubert—is strongly determined by gestural attitudes. This is best exemplified when comparing Glenn Gould's interpretation of Beethoven's op. 57 *Appassionata* with Vladimir Horowitz's version. Gould's performance

completely lacks gesturality. His "analytical" reading is the opposite of what Adorno recommended, and amounts to Beethoven minus gestures, a substantial negation given the strongly gestural nature of Beethoven's music. Hatten confirms this in theory, as does Gould by his counterfactual experiment. We may refer to *Categorical Gestures,*[44] in which gesturality in Beethoven's *Hammerklavier* sonata, op. 106, has been analyzed using a mathematical theory of gestures.

Hatten's definition of a gesture reads as follows: "Gesture is most generally defined as communicative (whether intended or not), expressive, energetic shaping through time (including characteristic features of musicality such as beat, rhythm, timing of exchanges, contour, intensity), regardless of medium (channel) or sensory-motor source (intermodal or cross-modal)." He distinguishes his understanding of gestures from the school of Adam Kendon and David McNeill in that (i) semantic aspects are not characteristic and (ii) he stresses "energetic shaping through time," an interesting wording, since the main subject is "shaping" an action—not the shaping of something, but pure action. The making in itself becomes a central feature, not the resulting facts generated by the making! In remarkable congruence with Wieland's abstract geometry of gestures, he adds that: "At a higher, more symbolic cognitive level, the representation of gesture may be considered amodal, in that it is not restricted to any particular modality."

We should also recall that Cecil Taylor, the *monstre sacré* of free jazz piano, describes his approach to creative improvisation with these words: "I try to imitate on the piano the leaps in space a dancer makes." This is a completely gestural concept, and in a documentary entitled *All the Notes* by Christopher Felver, Taylor says about score reading that deciphering those symbols takes away most of the energy for creativity.[45]

In short, we recognize that there are numerous approaches to music and performance theory that stress the primordial role of gestures in their conception as pre-semiotic components of a deeper understanding of music.

Let us now provide a short overview of the mathematical theory of gestures that we have developed since 2002. But it is a theory of expressions that point in a complex way to gestures, those exotic "animals of human communication" that we try to understand in their dynamical behavior. It is in no way an attempt to turn gestures as such into signs. In this section, mathematical prerequisites are required, and reference to introductory texts[46] or the forthcoming book[47] is recommended. This approach is inspired by Saint Victor's definition, but it gives it a formal shape that enables the development of an interesting concept architecture and the proof of powerful theorems. This theory was

developed as a theory of musical gestures to capture many of the problems that have been mentioned above. However, this mathematical formalism is also applicable to more general contexts of gestural utterance, such as dance and painting.

To begin with, a semiotic setup that attempts to generate a precise formalism of gestural structures is proposed. Notice that this is not an attempt to recast gestures as signs, but as entities that may be expressed as mathematical structures. In terms of Hjelmslev semiotics, this amounts to establishing a gesture semiotic *GestSem* that has an expressive level Ex(*GestSem*), which realizes a mathematical theory of gestures, i.e., a classical system Ex(*GestSem*) = *MathGest* within the semiotic of mathematics that offers a set of "expressions" or "forms" that point to gestures, the content level Ct(*GestSem*) = *Gestures* of gestures proper. The signification level Sg(*GestSem*) is not restricted to any particular gesture, meaning that we may set Sg(*GestSem*) = *GestSem*. This means that the semiotics of gestures is its own signification level, that its expressive level is a mathematical theory of gestural forms, and that gestures remain closed off from metatheoretical specifications: gestures are not signs. A definition of the pointer gesture will be given below, when the formal theory is explained.

In what follows, "gestures" or "mathematical gestures" will be discussed, although the focus is on expressions that signify gestures. To define a mathematical gesture, we need a directed graph Σ (short form: digraph) and a topological category X. The latter is essentially a category where the category-theoretical operations are all continuous. A topological space is a special case of such an X. We turn X into a digraph C(X) by considering the space C(X) of all continuous curves, in fact continuous functors, c: I —> X on the unit interval I = [0,1]. The domain I is interpreted as a topological category, whose objects are the points x in I, and whose morphisms are the pairs (x, y) for $x \leqq y$. The digraph's arrows are these curves, its vertices are the objects of X, and the head and tail maps are h(c) = c(1) and t(c) = c(0). A gesture is a digraph morphism g: Σ —> C(X), where Σ is called g's *skeleton*, while X is called the gesture's *body*. Intuitively, and realizing much of Saint Victor's definition, a gesture is a representation of the skeleton as a configuration of curves in the gesture's body.

A simple sign in *GestSem* would be the pointer P. We could set Ex(P): ↑ —> C(I), the map which sends the digraph ↑ (with one arrow that connects two different points) to the identity curve Id: I —> I, we would define Ct(P) = the gesture of pointing, and finally Sg(P) = P, the self-reference. One could then also declare the middle signification level in Hjelmslev's model to be identified with *GestSem,* thereby replacing the simple pointer by any gestural structure.

A first noteworthy fact is that the set Σ@X of gestures with skeleton Σ and body X is canonically endowed with the structure of a topological category. This implies that we may now consider gestures in Δ@Σ@X, i.e., gestures with another skeleton Δ and their body being the topological category Σ@X. These are gestures of gestures, or (mathematical) "hypergestures." The iteration of the gestural construction is a powerful technique for constructing most complex gestural anatomies. The main result with regard to hypergestures is the Escher Theorem.[48]

Escher Theorem: If $\Sigma_1, \Sigma_2, \ldots \Sigma_n$ are digraphs, X a topological category, and if p is a permutation of the set {1,2,...n}, then the two topological categories of hypergestures $\Sigma_1@\Sigma_2@ \ldots \Sigma_n @X$ and $\Sigma_{p(1)}@\Sigma_{p(2)}@ \ldots \Sigma_{p(n)} @X$ are canonically isomorphic.

This theorem looks abstract, but it has important consequences for musical creativity. Let us look at two applications:

(i) The interaction with a fellow musician in improvisation often boils down to interpreting his/her musical utterances in a different way to create new perspectives. And in such an endeavor, the Escher Theorem helps reconsider a given hypergestural configuration from a new angle. A loop of rhythmical curves might be reinterpreted as a curve of rhythmical loops, for example. This is exactly what the Escher Theorem sets forth: it provides you with a new, albeit equivalent, perspective on what's going on.

(ii) The second example relates to the first species: voice against voice, of classical Fuxian counterpoint. There are two interpretations of the conjunction of *cantus firmus* with *discantus*. One reads the *discantus* voice as being the *punctus contra punctum*, the *cantus firmus* being the first voice against which the *discantus* is set. Reading this configuration as a hypergesture, the gesture of *cantus firmus* is deformed in a hypergesture to the gesture of *discantus*. This interpretation reads *contra* (counter) as being an opposition of two voices. This interpretation is often given in counterpoint courses, but it is erroneous for two reasons. To begin with, the intervals between *cantus* and *discantus* are all consonant, so there is no rationale for calling this relation a *contrapunctus*. Second, it is historically inaccurate.[49] The historical *contra* idea was understood as being a counterposition to successive intervals; the tension was to be built when stepping from one (consonant) interval to its (consonant) successor. *Punctus* meant interval, and it is in fact well known that contrarious movement of voices is used and preferred when building first species configurations. This second interpretation does not view the *discantus* as a deformation of the *cantus firmus*, but it considers the interval gestures as

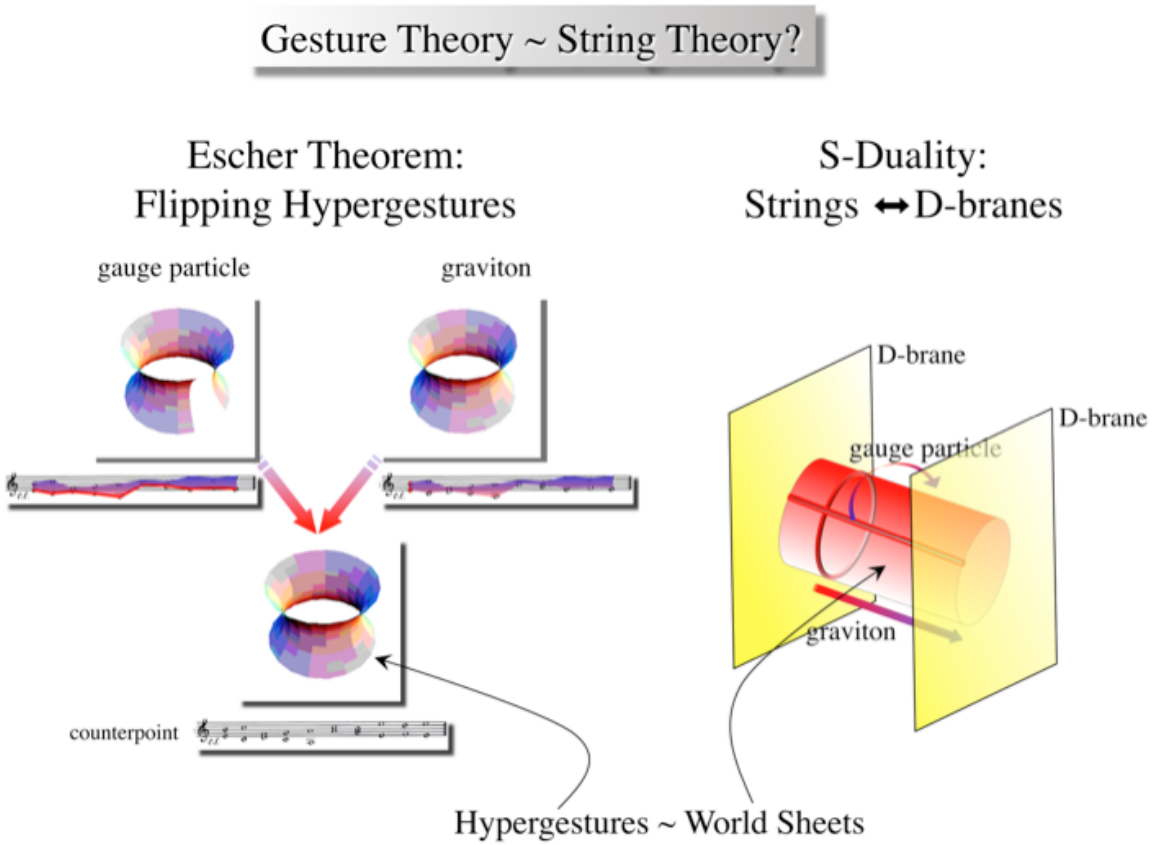
being deformed into each other along the time axis in a hypergesture of temporal deployment. The Escher Theorem however reconciles these two interpretations as being related to each other by the isomorphism that it provides.

Gestural Creativity

Musical creativity has always been a mysterious business since it is not only creativity as such, but moreover remains largely closed off from verbalization. Music is created in a nonverbal process. But if we look at creativity in general, it is largely pre-semiotic since it deals with opening boxes, transcending given languages and formal environments. Creativity is a semiotic generator.[50] Therefore, the gestural layer is quite canonical as a candidate for understanding and performing musical creativity.
In my book *Flow, Gesture, and Spaces in Free Jazz,*[51] I have described musical creativity in jazz, especially free jazz, using these ideas. It is about making the rules (in the sense of Charles Alunni), negotiating them in a gestural interplay, and establishing a distributed identity as a rotational movement around the axis of a distributed identity. This is what Ornette Coleman meant when he said he wanted to "play the music, not the background" in the liner notes of his famous album *Free Jazz*. He wanted to step away from the reproduction of others' ideas, and to make music without copying a pre-established template. This is why Cecil Taylor imitates a dancer's leaps in his creative piano universe. He does not want to imitate given forms. His aim is to express his dancing thoughts.

Gestures and Strings

The softening of creative knowledge production in a gestural approach not only softens the conceptual framework, it also softens the barriers between disciplines. Soft knowledge cannot be limited by traditional disciplinary walls. This type of transgression of disciplinary limits is in fact observed in our theory of hypergestures, especially for the example of counterpoint cited above. The Escher Theorem enables an exchange of roles in hypergestural combinations. External gestural skeleta can be exchanged with internal skeleta. A loop of lines can be transformed into a line of loops. This gestural insight is in fact also observed in physical string theory, where in S-duality, strings can be reinterpreted as branes, and gauge particles as bosons.[52]



Gesture Theory – String Theory? (Guerino Mazzola).

This situation is parallel to musical counterpoint, which can be interpreted as a hypergesture between *cantus firmus* and *discantus* or as a hypergesture of unfolding intervals.

This string-theory connection has been realized in a third application of mathematical gesture theory in music that relates to the investigation of the complex *transitional process between reading a score in its symbolic realm and performing it in physical reality.*[53] The model here represents the score data as *symbolic gestures* and the performed events as *physical gestures*, and then connects these two components by a *hypergesture* that is constructed following the Lagrangian formalism from physical string theory. This model enables a detailed analysis of the artistic potential that shapes the connection between symbolic and physical gestural utterance.

Playing the Multiversed Game in a Pre-Semiotic Ontology

If we collect and summarize the dramatic changes in the basic conditions of Hesse's glass bead game, we can state that it has the following new features:

(a) It is played by a distributed identity of collaborators;

(b) It is not following given rules but creates them on the spot and according to an interplay of equivalent partners, in a pre-semiotic layer;
(c) The collaborative interplay is made by gestural exchanges, by a comprehension that does not follow templates but is built upon the repercussion of gestural dynamic;
(d) The conceptual framework is successful in its creation of a rotational energy around the axis of a distributed identity. Success is possible and addressed, but it does not result from given criteria; it is established in a distributed harmony without the time-space invariance of traditional laws.
These characteristics redefine the glass bead game of "melting glass beads" with the following consequences:
(a) The gestural ontology is not auxiliary or preliminary to a factual layer of reality. It has its own persistent reality that does not serve what might become the case later on;
(b) The incessant gestural remaking of rules and concepts eliminates the world's unicity, completing the historical suspensions of geocentricity (Copernicus), anthropocentricity (Darwin), chronocentricity (Einstein), and ratiocentricity (Turing), and adding the suspension of factocentricity;
(c) Creativity is no longer delegated to arcane divinities; it has also become a radically human endeavor. Creation is no longer limited to God's initial Big Bang;
(d) The transdisciplinary parallel between music and physics shows these parallelisms: hypergestures—strings, Escher Theorem—duality, works (typically 10_{37} 72-element motives)—universes (10_{450} string theory landscapes), and communication via gesture interaction—Interaction via exchange of bosonic strings.

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Guerino Mazzola qualified as a professor of mathematics (1980) and of computational science (2003) at the University of Zürich. He has published 22 books and 130 papers, made 23 jazz CDs (as a pianist and composer), and composed a classical sonata. In 2000, he was the winner of the Medal of the Mexican Mathematical Society. In 2005, his book *The Topos of Music* was proposed as book of the year to the American Mathematical Society.

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The Glass Bead Game Revisited: Weaving emergent dynamics with the MES methodology

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Introduction

The Glass Bead platform aims at "navigating between heterogeneous and increasingly specialized epistemic sites" and constructing "the conditions for universal transits that transform the sites between which they operate." It borrows its name from the Glass Bead Game (GBG) presented in the book Magister Ludi by Hermann Hesse[1] (1943) as embodying "the ideal goal of *universitas litterarum*." The aim of this article is to discuss this reference by answering the following questions:
(i) In which sense is the GBG "creative" and is it compatible with the Glass Bead platform's project?
(ii) If not, can we invent a "Revisited GBG" (RGBG) to achieve the platform's creative objectives?
(iii) What could we learn from such an RGBG in terms of transdisciplinary research?

In What Sense is the GBG "Creative"?

To study in which way the GBG is creative or not, here we use the general definition given by Margaret Boden[2] as follows: "Creativity is the ability to come up with ideas or artifacts that are *new, surprising and valuable,*" and refer to the three types of creativity

that she distinguishes as follows: *Combinatory creativity* "involves making unfamiliar combinations of familiar ideas … and the ability to form links of many different types"; *Exploratory creativity* "explore(s) a structured conceptual space, mapped by a particular style"; and *Transformational creativity* means "thoughts are now possible which previously (within the untransformed space) were literally inconceivable" and "by definition, flouts some of the accepted rules."

In the book, two more or less opposing interpretations of the GBG can be found.

First interpretation: "These rules, the sign language and grammar of the Game, constitute a kind of highly developed secret language drawing upon several sciences and arts … a mode of playing with the total contents and values of our culture."[3]"Stress was placed on new, bold, and original associations of themes, impeccable logic, and beautiful calligraphy."[4]

Second interpretation: "A universal language and method for expressing all intellectual concepts and all artistic values and reducing them to a common denominator";[5] "the quintessence of intellectuality and art";[6] "keeping the Game ever at the summit of our entire cultural life, by incorporating into it each new achievement, each new approach,"[7] with, however, one constraint—that "any enrichment of the language of the Game by addition of new contents is subject to the strictest conceivable control by the directorate of the Game."[8]

With the above definitions, we see that the first interpretation of the GBG leads to essentially *combinatory creativity* ("new, bold, and original associations of themes"), while the second one reflects *exploratory creativity* in the conceptual space of the whole culture ("incorporating into it each new achievement, each new approach"). As far as *transformational creativity* is concerned, there is no clear evidence of such a possibility ("addition of new contents is subject to the strictest conceivable control by the directorate of the Game"); at most, it may be possible at the border, but is unlikely.

Following this analysis, it seems that albeit creative in two fecund ways (*combinatory* and *exploratory*), the GBG as described in the original book may nevertheless be limited in terms of achieving the abovementioned aims of the Glass Bead platform, which include *transformational creativity* ("universal transits that transform the sites between which they operate"). In the next section, we therefore propose to build a *Revisited GBG* (RGBG) by analyzing the evolution (since 1987) of the theory of *Memory Evolutive Systems* (MES), a mathematical methodology developed by A. Ehresmann and J.-P. Vanbremeersch

(hereinafter abbreviated as EV).[9] This RGBG will show how the rules of the GBG could be modified to allow for innovative transdisciplinary research achieving transformational creativity, and therefore meeting the objectives of the Glass Bead platform.

Review of Category Theory and MES

MES are based on Category Theory, a mathematical domain introduced by Eilenberg & Mac Lane in 1945.[10] This domain leads to 'relational' mathematics, in which the 'structure' of the objects is deduced from the relations between them. At the crossroads between mathematics, logic, and metamathematics, it reflects the main operations of the "working mathematician" (title of a book by Mac Lane, 1971, to which we refer for the main notions[11])and has a unifying role in mathematics: "This theory of categories seems to be the most characteristic unifying trend in present day Mathematics" (Ehresmann, 1967).

We define a category as a (multi-)graph C on which there is given a composition of arrows which is associative and with identities; here a graph G consists of a set of objects A, B, ..., and a set of arrows f: A → B between them; a path of G is a sequence of successive arrows. More precisely, a category is defined as a graph C with a composition law associating to each 2-path (f: A → B, g: B → C) a composite gf: A → C satisfying: (i) each object A has an identity arrow idA whose right or left composite with f from (or to) A is equal to f; and (ii) the composition is associative so that each path has a unique composite whatever its 2-2 decomposition. We say that 2 paths are operationally equivalent if they have the same composite. An arrow is also called a morphism or link. Examples of categories are (i) "small categories" such as monoids, groups, posets, and categories of paths of a graph (composition = convolution), and (ii) "large categories" such as the category of sets Set and categories of (pre-)sheaves, toposes.

MES provide an integrative methodology, based on a 'dynamic' category theory, for the study of living systems in their 'becoming' and account for their main characteristics, i.e.:

(i) Hierarchy of components varying through successive structural changes such as addition, combination and/or destruction of components;

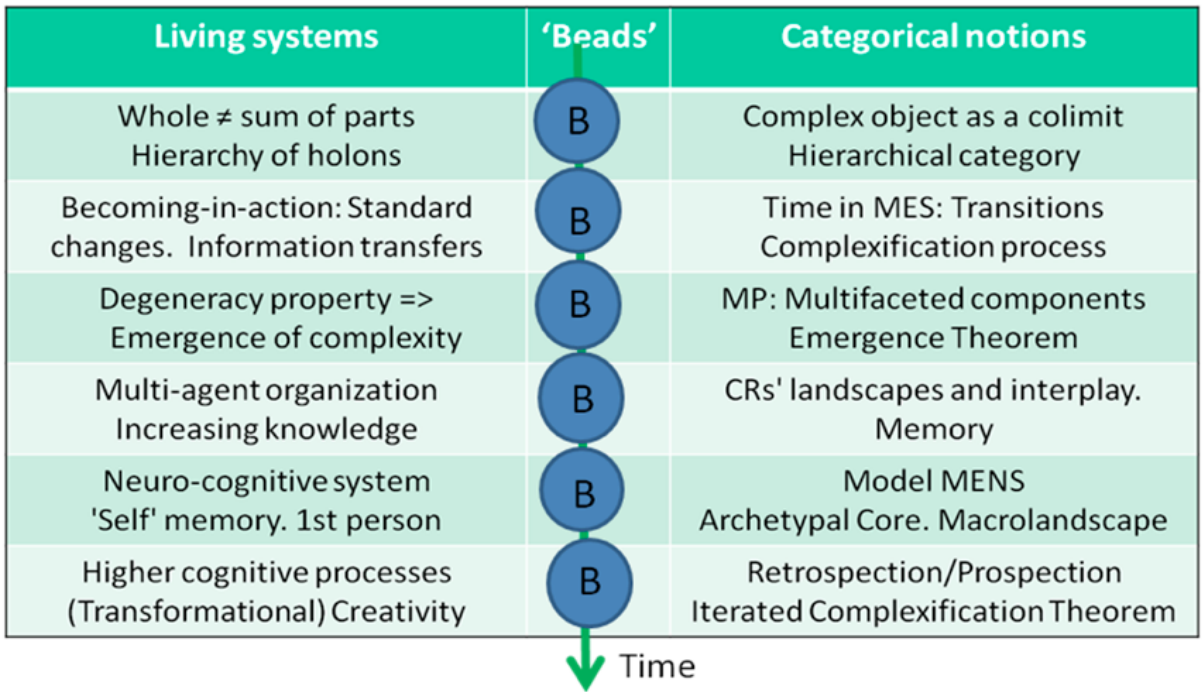
(ii) Multi-scale self-organization, the global dynamic weaving local operative dynamics, with the mediation of a flexible central 'memory' allowing for adaptation;

(iii) Emergence of higher cognitive processes, up to consciousness, anticipation, and creativity.

The next section will show how the progressive development of MES can be retraced as a RGBG called categorification of emergence in living systems.

Categorification of Emergence in Living Systems as a Revisited Glass Bead Game

The game is played stepwise, each step consisting of two successive processes which modify and extend the knowledge basis by addition, suppression or modification of beads:
(i) Retrospection: Recall of 'beads' in the existing knowledge basis in relation with specific characteristics of living systems. It is played by gathering different authors' quotes about them.
(ii) Prospection-complexification: Creation of adapted categorical notions which become new 'beads' representing a mathematical model of the characteristics.
The following table summarizes the successive steps with, on the left, characteristics of the living system recalled from the knowledge basis, and, on the right, name(s) of new beads transferring this knowledge into categorical notions.



Bead 1: Hierarchical Category

1. "A system is a set of units with relationship between them."[12] The configuration of the system at an instant t is modeled by a category Ht: an object represents the state of a component at t, the morphisms represent the relationships between components.
2. "The whole is something else than the sum of its parts" (Aristotle). In Ht the complex "whole" is represented by an object C which 'combines' a pattern (or diagram) P of linked objects Pi representing a decomposition of C, so that C has the same operational role as P

acting collectively. C is modeled by the colimit[13] of P in H*t*.
3. "*Tout objet que considère la Biologie représente un système de systèmes; lui-même élément d'un système d'ordre supérieur.*"[14] To account for components of a living system with different complexity levels (atoms, molecules, cells, etc.), we introduce (see EV) the notion of a *hierarchical category*, i.e., a category whose objects are attributed an integer, called its *complexity level*, with the property: an object C of level *n*+1 is the colimit of at least one pattern P of linked objects of levels ≤ *n* through which it can operate.
4. Koestler[15] proposes the word *holon* to describe the "hybrid" nature of the components of living systems, comparing them to "two-faced Janus." In a hierarchical category Ht an object C of level *n*+1 has such a "Janus" nature: it is "simple" with respect to levels > *n*+1, "complex" with respect to levels ≤ n. Then C admits at least one *ramification* down to level 0 (see Figures 1 and 2); its *complexity order* is the smallest length if its ramifications.

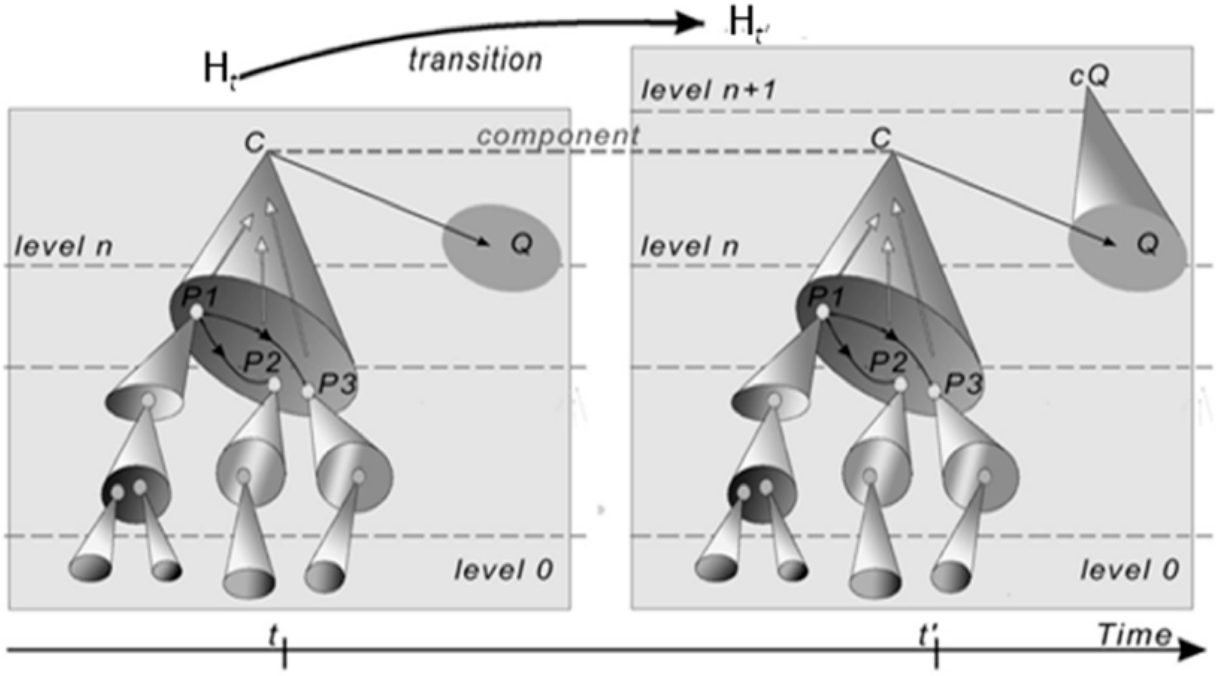


Figure 1. Hierarchical Evolutive System, with a ramification of C

Bead 2: The Role of Time — Hierarchical Evolutive System. Complexification Process
1. "La Dynamique, entendue au sens le plus général de science des actions du temps dans les états d'un système"[16] To model the possible addition/suppression of components over time, we introduce the notion of a (Hierarchical) Evolutive System (see EV): a (H)ES H consists of: (i) the family (H*t*)*t* of the (hierarchical) configuration categories of the system, indexed by its timescale Time; and (ii) for each $t < t'$, a functor, transition, from a subcategory of H*t* to H*t'* measuring the change. These transitions respect a transitivity

condition so that a *component* of the (H)ES is a maximal family of objects (its successive states) connected by transitions; similarly a *link* between components is a family of transition-connected morphisms. A link has a *propagation delay* and is *active* (meaning: transferring information) or not at *t*.

2. Thom distinguishes four "archetypal singularities": Birth, Death, Scission, Confluence.[17] In a HES, these structural changes become: 'adding' a set A of external elements; 'suppressing' or 'decomposing' a set S of components; and given a set Π of patterns, combining the linked components of each P in Π by 'adding' a colimit cP to P. Given a procedure Pr on H*t* with objectives of these kinds, we construct a category, called the *complexification*[18] of H*t* for Pr, in which these objectives are 'optimally' satisfied; it is explicitly constructed by induction (see EV). The transitions are generated by *complexification processes.*

Bead 3: Multifaceted Components. Emergence Theorem

1. "Degeneracy, the ability of elements that are structurally different to perform the same function or yield the same output, is a ubiquitous biological property … a feature of complexity."[19] In a HES, degeneracy is modeled by the Multiplicity Principle (MP) which ensures the existence of n-multifaceted components, where a component C is n-multifaceted if it is the colimit of at least 2 patterns P and Q of levels ≤ n which are structurally different and not connected[20] by a cluster of links (see Figure 2). Thus, at a given time, C can operate through any one of them and switch between them, up to its own destruction.

2. "A composite Individual can be affected in many ways and still preserve its nature."[21] In a HES, a component C is a dynamic system which preserves its own individuation over time independent from its lower structure (e.g., a cell keeps its identity though renewing its molecules in time). C can operate through different ramifications, losing some of them and/or acquiring new ones.

3. Popper insists on the role of "change in the conditions of change."[22] A consequence of MP is the possible emergence, through complexifications, of composites of *simple links*[23] which bind nonadjacent clusters separated by a switch (see Figure 2) and are not simple. Such *complex links* represent *emergent properties* at a level n+1, not observable at levels ≤ n, although dependent on their global structure; they allow for "change in the conditions of change."

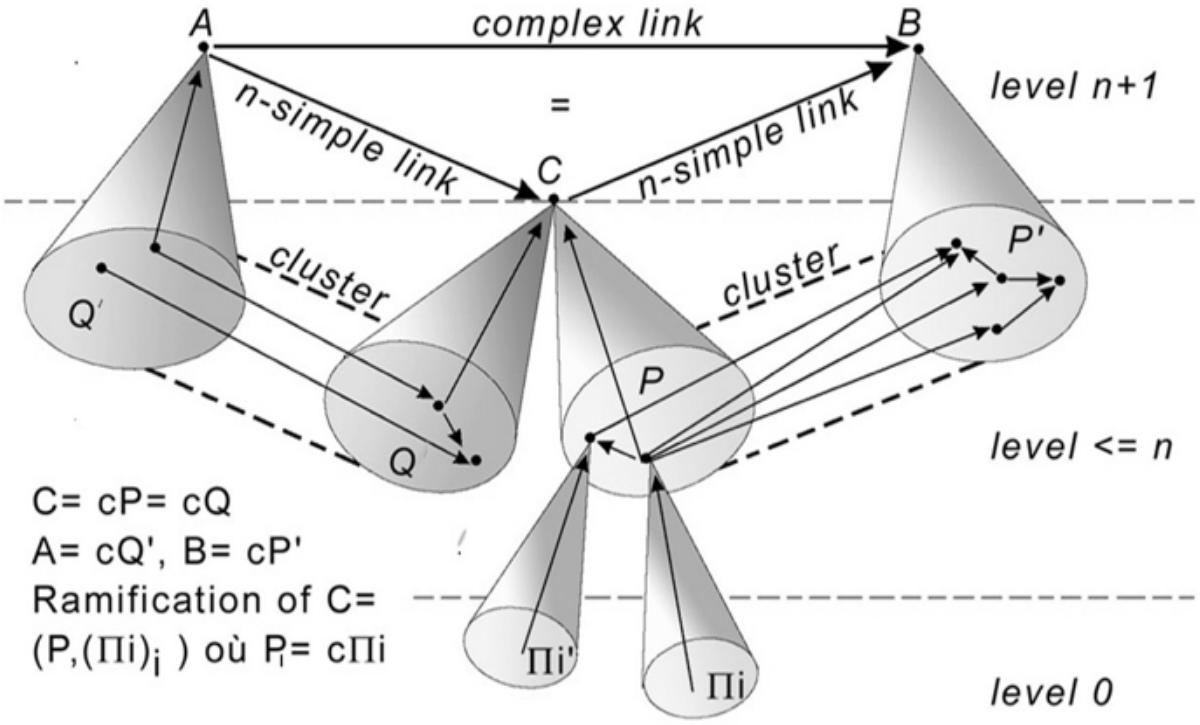


Figure 2: Simple and complex links

Emergence Theorem.[24] If *MP is satisfied, a complexification also satisfies MP and it can lead to the formation of multifaceted components of higher complexity orders and to the emergence of complex links between them.*

Iterated Complexification Theorem.[25] *A complexification of a complexification of Ht in which complex links play a role cannot be reduced to a unique complexification of Ht.*

Bead 4: MES as a Cognitive Multi-Agent System

1. *"Memory, as a constraint holding over events of the past and the present and a relation between them"* (Ashby[26]). A MES is a HES with a 'memory' storing knowledge of various kinds for better adaptation to its environment. This memory is represented by a sub-HES Mem which develops over time by formation of multifaceted components of increasing complexity order; this development is a consequence of the Emergence Theorem, which, thanks to MP, also implies that the memory is both robust and flexible.

2. *"Les agents n'ont qu'une représentation partielle de leur environnement, c'est-à-dire qu'ils n'ont pas de vision globale de tout ce qui se passe."*[27] A MES also has a network of internal agents, called *co-regulators*, and its overall dynamic weaves their different internal local dynamics. A co-regulator (CR) is a sub-ES with its own function, complexity, and rhythm, which acts stepwise with the help of the memory. At a step from t to t', it only accesses partial information through the active links arriving to its components during this step;

they form an evolutive system called its *landscape* L at *t*. An admissible procedure Pr is selected on L (using Mem) and realized by a dynamic process during the step. The result is evaluated at *t'*: there is a *fracture* for CR if the expected result is not attained.
3. "Ability of agents to autonomously plan and pursue their actions and goals, to cooperate, to coordinate, and negotiate with others" (Wooldridge & Jennings[28]). The global dynamic results from interplay among the co-regulators to harmonize their different procedures, with risk of fractures for some co-regulators.

Bead 5: MENS—An Integrative Model of the Neuro-Cognitive System

1. Hebb shows that a mental object activates a *synchronous assembly of neurons*.[29] This assembly is not unique because of the *degeneracy of the neural code*.[30] A MENS is a MES whose level 0 components represent neurons (with their activity) while a higher level component, called *cat(egory)-neuron*, models a more or less complex mental object M constructed as the colimit cP = cP' of the different synchronous assemblies of (cat-)neurons P , P' activated by M. Formally, a MENS is obtained through successive complexifications of the *Evolutive System of Neurons* (NEUR) whose links represent synaptic paths between neurons (with their propagation delay and strength at *t*). The degeneracy of the neural code implies that MENS satisfies MP.
2. "Existence of a Structural Core in human cerebral cortex, both spatially and topologically central … linked to self-referential processing and consciousness."[31] In time the memory of MENS develops a strongly connected sub-ES, called the *Archetypal Core* (AC), whose components are higher order multifaceted cat-neurons with many ramifications having their base in the Structural Core; they are linked by strong and fast complex links which form *archetypal loops* self-maintaining their activation for a long time. Archetypal records integrate significant memories of different modalities; they self-maintain their activation for some time through archetypal loops and diffuse it to lower levels by the unfolding of ramifications. AC represents the "Self" and acts as a motor in the formation of higher cognitive processes.
3. "The physical bases of conscious states consist of spatially dispersed, but re-entrantly interconnected, neuronal groups in a widely distributed set of brain areas."[32] The co-regulators of MENS are sub-ES based on specialized brain modules. Among them, we distinguish *intentional co-regulators* which are co-regulators directly linked to AC, whose components are of higher complexity order and have ramifications based on associative brain areas (cf. Crick's "conscious units"[33]). These co-regulators and the links between their components act as a macro-co-regulator *Int*, in particular to form a landscape, called a *macro-landscape*.

Bead 6: Higher Cognitive Processes. Consciousness. Creativity

1. "Conscious processes arise spontaneously and display intentionality, i.e., for the most part, each is about something."[34] An unexpected or striking event or problem S activates part of AC. The activation diffuses in AC via archetypal loops and propagates to different levels, down to lower levels through the unfolding of ramifications and switches between them. Transmitted back to *Int*, it leads to the formation of a long term macro-landscape (ML).

2. *"Il y a dans le présent une rétention du passé et une protention du futur (de ce qui va immédiatement arriver).'*[35] ML unites and extends spatially and temporally the landscapes of the intentional co-regulators through exchanges between them. As archetypal loops are self-maintained, ML persists for a long time. Due to the activation delays, links coming from lower levels can transmit information of just-passed events, including 'non-conscious' information (about instinctive motor or perceptive behaviors, emotions and affects, reflexes,...), allowing ML to support embodied cognition.

3. Creativity as "a process of discovery and invention that begins with an open question and continues with a run through a sequence of well-defined operational steps."[36]

ML gives a space for the development of higher conscious mental or cognitive processes, up to consciousness, creativity and anticipation, through the iteration of the overlapping processes:

(i) *Retrospection*, i.e., in ML, analysis of the situation and recall of the near past for, with the help of the memory, "making sense" of the present situation (by abduction), its trends and future potential;

(ii) *Prospection*, i.e., the construction of 'virtual' landscapes ("mental spaces") in ML in which sequences of procedures are tried and 'virtually' evaluated with the help of the memory;

(iii) *Complexification* for the selected procedure(s).

A particular case is the RPC-method for creativity[37] which characterizes transformational creativity by iteration of complexifications where emergent complex links introduce rules for changing the rules, which must be slowly integrated.

Discussion and Conclusion: Characteristics of the Revisited GBG

Playing a GBG can be interpreted as the evolution of a particular MES. The components are: those interested in the game, especially players and the judges (who act as co-regulators); and the Archives of the game, in particular the hierarchy of beads, which represent the Memory. The game combines patterns of already existing glass beads from

different domains, forming colimits named by the corresponding hieroglyphs. However, as we have seen, to develop higher order memory, the system should satisfy the multiplicity principle, meaning beads should not be rigid (as 'glass') but flexible and multifaceted in order to adapt to changes; moreover, transformational creativity would require the possibility of new rules changing the rules.

The Case of Hesse's Glass Bead Game

In Hesse's work, a basic assumption is that there exists a "large category" (a topos?) TOT representing the whole of knowledge, values and culture, and the Game takes place within it. The players only know a part H of TOT through their landscape L, and the aim of the game is to extend H by discovering more of the structure of TOT.
Thus, the Game remains inside of TOT. A GBG consists in exploring H, selecting a procedure Pr on it (through L) and constructing the complexification C of L for Pr. As the category TOT is cocomplete (meaning any pattern has a colimit in TOT), the 'difference' functor Diff: L → TOT extends to C (universal property of the complexification), and the image H' of C in TOT reduces to a Pr-complexification of H internally to TOT. The players' new landscape reflects H.'
These operations allow for combinatory or exploratory creativity since the complexification process 'combines' the Pr-specified patterns; and the selection of Pr leads to an exploration of mental spaces. They do not lead to transformational creativity because this would require "change in the conditions of change," i.e., the formation of new complex links in successive complexifications (Iterated Complexification Theorem, Section II). However, the image of a complex link appearing in C already exists in the cocomplete category TOT, and hence in its image H' in TOT, so that it does not lead to further change in a later complexification.

A Revisited GBG Can Attain Transformational Creativity

The RGBG played in Section II does not suppose the existence of TOT. Instead, it supposes there is real 'evolution' of the knowledge base (memory) over time, with addition/suppression of new knowledge. It can therefore lead to transformation creativity if the associated MES satisfies MP. Whence we arrive at the characteristics to be added to the Glass Bead Game in order for it to attain transformational creativity.

Theorem. The revisited GBG may lead to transformational creativity if it includes the following changes:
1. The beads should be multifaceted to allow for flexibility and 'real' emergence (MP).
2. They should be destructible (suppression of no more valid knowledge).
3. Rules "for changing the rules" (complex links) should be accepted.
With these modifications, the Game could cover the aims of the Glass Bead platform and lead to innovative transdisciplinary research.

Footnotes

1. Hermann Hesse. *Magister Ludi, The Glass Bead Game.* Trans. R. & C. Winston. New York: St. Martin's Press, 1943. 11. Print.

2. Margaret Boden. *The Creative Mind; Myths and Mechanisms.* 2nd ed. London: Routledge, 2004. 16-21. Print.

3. Hermann Hesse. *Op. cit*. 10.

4. *Ibid.* 181.

5. *Ibid.* 111.

6. *Ibid.* 132.

7. *Ibid.* 218.

8. *Ibid.* 10.

9. See Andrée Ehresmann and J.-P. Vanbremeersch. *Memory Evolutive Systems; Hierarchy, Emergence, Cognition*. 1st ed. London: Elsevier Science, 2007. 402. Print.

10. See Samuel Eilenberg and Saunders Mac Lane. "General Theory of Natural Equivalences." *Trans. Am. Math. Soc*. 58, 1945. 231-294. Print.

11. Saunders Mac Lane. *Categories for the Working Mathematician*. New York: Springer-Verlag, 1971. 317. Print.

12. Ludwig von Bertalanffy. "Untersuchungen über die Gesetzlichkeit des Wachstums." *Roux'Archiv* Issue 108 1926. Print.

13. A *pattern* in H_t is a family of objects P_i connected by distinguished morphisms f: $P_i \to P_j$. A *cone* from P to an object A of H_t is a family of morphisms s_i: $P_i \to A$ such that $s_i = s_j\, f$ for each f: $P_i \to P_j$. cP = *colimit* of P if there is a *colimit-cone* $(c_i)_i$ from P to cP such that, for each cone $(s_i)_i$ from P to A there is a one and only one morphism s: cP → A such that $s_i = s\, c_i$ for each *i.*

14. "Each object considered in biology represents a system of systems, itself an element of a higher order system." François Jacob. *La logique du vivant*. Paris: Gallimard, 1970. 326. Print.

15. Arthur Koestler. *Le cri d'Archimède*, Paris: Calmann-Lévy, 1965. 452. Print.

16. “Dynamics, taken in the most general sense of science of the actions of time on the states of a system.” René Thom. *Modèles Mathématiques de la Morphogenèse*. 10/18 collection. Paris: Union Générale d’Edition, 1974. Print.

17. René Thom. *Esquisse d’une Sémiophysique*. Paris: InterEditions, 1988. 57. Print.

18. The *complexification* H’ or Ht for Pr is the ‘universal solution’ of the problem: to construct a category H’ and a functor F from a sub-category K of Ht to H’ such that: (i) K contains A and does not contain S; and (ii) for each P in Π the pattern FP image of P by F admits a colimit cP in H’; if P has a colimit in Ht, cP is the image of this colimit by F; otherwise cP ’emerges’ in H’ to become the colimit of FP. For the explicit construction of H’, see EV.

19. Gérald M. Edelman and Joseph A. Gally. “Degeneracy and Complexity in Biological Systems.” *Proc. Natl. Acad. Sci*. USA Vol. 98 Nov. 2001, 13763-13768. Print.

20. In a category, two patterns with the same colimit M are *structurally non-connected* if they are not isomorphic and there is no cluster between them binding into the identity of M; then M is *multifaceted*.

21. Benedict de Spinoza. *The Ethics*. 1677. Trans. R. H. M. Elwes. Web.

22. Karl Popper. *The Poverty of Historicism*. London: Routledge Classics, 1959. 176. Print.

23. If P and P’ are patterns having respectively colimits C and B, a cluster G from P to P’ binds into a unique morphism cG from C to B, called a (P, P’)-*simple link*, or *n-simple link* if P and P’ are of levels ≤ *n*. An *n-complex link* is a morphism which is not *n-simple* though it is the composite of n-simple links binding non-adjacent clusters separated by a switch (see Figure 2 and EV.)

24. Andrée Ehresmann and Jean-Paul Vanbremeersch. *Memory Evolutive Systems; Hierarchy, Emergence, Cognition*. London: Elsevier, 2007. Chapter IV: 402. Print.

25. *Ibid*.

26. W. Ashby. “Principles of the Self-Organizing System.” *Principles of Self-Organization: Transactions of the University of Illinois Symposium*. Eds. Heinz Von Foerster and George W. Zopf, Jr. Pergamon: London, 1962. 225-268. Print.

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Transcendental Logic and True Representings

Ray Brassier

The task of "transcendental logic" is to explicate the concept of a mind that gains knowledge of the world of which it is a part. The acquisition of knowledge by such a mind involves its being acted on or "affected" by the objects it knows.[1]

Sellars's characterization of transcendental logic presupposes his commitment to transcendental naturalism. Transcendental naturalism seeks to identify the general features any conceptual system must possess in order to know the nature of which it is a part. It is bound by a minimal constraint of immanence: the mind's immanence to nature. Our minds are a part of nature. But what 'nature' is and what 'minds' are is not yet fully determined. The constraint of immanence has the following consequence: if our minds are a part of nature, then what we know about our own minds cannot differ fundamentally in kind from what we know about other parts of nature. We will see later that this has interesting ramifications for understanding the appeal to 'immanence' by many contemporary philosophers.

Understanding exactly *how* known objects "act upon" or "affect" the knowing mind is the fundamental problem. Although the mind is embedded in nature, it is not a mirror of nature. Sellars's rejection of the myth of the categorial given—the belief that the categorial structure of reality imprints itself upon the mind as a seal imprints itself on wax—means rejecting the presumption of a preestablished harmony between knowing mind and known world. This is effectively to rule out intellectual intuition as a means of accessing the fundamental structure of reality. Human understanding is discursive, not intuitive. Its medium is what Kant called judgment and what Brandom calls assertion, which always stands in a variety of justificatory relations to other judgments or

assertions. To characterize a creature as minded is not to give an empirical description of it but to recognize it as capable of participating in the game of giving and asking for reasons.

The converse of the claim that human understanding is discursive is the claim that human intuition is sensible, not intellectual. To say that our intuition is sensible is to say that our discursive understanding of nature as the totality of objects existing in space and time is conditioned by the way nature appears to us in both space and time. This is the problem of representation, first formulated by Kant. If nature is cognizable to the extent that it is representable, then nature is the system of true representations or actual states of affairs. But as Sellars points out, "[N]ot every system of empirical representables constitutes nature, but only that system of empirical representables, the representings of which would be true."[2] Transcendental logic aims to uncover both what it is for something to be an "empirical representable" and what it is for something to be a "true representing." Understanding the former involves grasping the way in which conception interacts with sensation. Understanding the latter requires grasping the nature of the connection between truth pertaining to what is conceptually *represented*, and truth pertaining to nonconceptual *representings*. In Kantian parlance, this is the question of the relation between understanding and sensibility. However, it cannot be reduced to the bald contrast between concepts and intuitions, for part of Sellars's revision of Kant involves extending the reach of the concept to intuition and acknowledging the indispensable role of *conceptual intuition*, whose operation is aligned with yet fundamentally distinct from that of nonconceptual sense-impressions. As we shall see, the latter are postulated in accordance with the requirements of transcendental logic to explain how conceptual intuition is guided by nonconceptual factors.

Intuition and Sensibility

The distinction between representing and represented is not the difference between two separate things but the formal (or transcendental) distinction between the reality of a thing insofar as it is represented and the reality of a thing independently of its being represented. This is the distinction between objective reality—reality immanent to the represented—and reality *an sich* (in itself), i.e., non-represented reality.

In Sellars's naturalistic revision of Kantianism, the distinction between represented and non-represented is contained within the immanent distinction between representing and represented. Thus four things need to be distinguished:[3]

- Non-representings in themselves

- Represented non-representings
- Representings in themselves
- Represented representings

But as there are two types of representings, conceptual and nonconceptual, we must also distinguish between:[4]

- Conceptual representings in themselves
- Conceptual representeds
- Nonconceptual representings in themselves
- Nonconceptual representeds

However, the distinction between conceptual and nonconceptual representings does not map on to the orthodox distinction between concepts and intuitions. It turns out that intuitions have conceptual form. Thus the relevant contrast is between intuition and sensibility. Intuition turns out to be conceptually informed, but conceptual intuition is determined by the nonconceptual structure of sensibility.

On the traditional account, intuitions deliver particulars which are perceived as being thus and so. Consider the following perceptual report:

I see this as a red rectangular brick

The traditional view maintains that my beliefs about the brick are distinct from my seeing the brick:

I see this *as* a red rectangular brick and I believe *that* this a brick with a red and rectangular facing surface

Here we have a distinction between intuitive perceptual taking, or "seeing as," and belief proper, which has propositional form. My seeing this as being thus and so and my belief that it is (or is not) thus and so are distinct, with the latter presupposing the former.

This traditional account falls prey to the myth of the categorial given: the assumption that to be aware of X is to be aware of it *as* X. In this version, the myth fuses thinking and sensing: it assumes that things present themselves to sensory consciousness already endowed with categorial form. We sense something as something before superimposing onto it our belief that it is thus and so:

I see this as a red rectangular brick and I believe it is too big for the job at hand

What is wrong here is the assumption that objects cause us to be in certain sensory states, and these sensory states are already endowed with the categorial form that allows them to play a justificatory role in empirical knowledge. The object causes me to see it as what it is and this justifies my subsequent beliefs about it and its relations to other objects. Causation and justification are illegitimately fused. By separating them, we distinguish between the sensory states which objects cause perceivers to be in, and the

perceptual states in terms of which perceivers respond to their sensory states. In order for these perceptual responses to play a justificatory role in empirical knowledge they must already be endowed with categorial form: they must be *seeings as* (or *hearings as*, *tastings as*, *touchings as*, *smellings as*). This is to say that they must involve categorially formed conceptual intuitions of sensible particulars. Once we acknowledge the fundamental role of conceptual intuition in empirical perception, we can subsequently distinguish between what we see *of* objects, and what we see objects *as*. What we see *of* an empirical object is a function of our embodied, perspectival relation to it; but this perspectival relation already presupposes the conceptual intuition of the object *as* something thus and so. What is intuited is never a bare particular; rather, it is a condition of our ability to intuit particulars that they be conceptually intuited as something. In the following passage, Sellars explains why conceptual intuition is an epistemically irreducible type of representation:

Consider the statements

This is a pyramid

This pyramid is made of stone

The first has the explicit grammatical form of a sentence.

So does the second. But notice that the grammatical form of a sentence is lurking in the subject of the second sentence.

From the standpoint of transformational grammar we would think of it as derived from the deep structure

This is a pyramid and it is made of stone

One might be tempted to think of 'this' as a pure demonstrative having no other conceptual content than that involved in being a demonstrative. Kant *does* think of an act of intuition as a demonstrative thought, a Mentalese 'this.' However he does not think of this Mentalese demonstrative as a *bare* Mentalese 'this.' An example of an act of intuition would be the Mentalese counterpart of

This cube facing me edgewise

where this is *not* to be understood as, so to speak, a Mentalese *paraphrase* of

This is a cube which faces me edgewise

The role of an intuition is a basic and important one. It is the role of bringing a particular object before the mind for its consideration. Thus, though there is a close relationship between

This cube facing me edgewise . . .

and

This is a cube which faces me edgewise.
the former is an *irreducible* kind of representation. It is a demonstrative representation which has conceptual content and grammatical form. As noted above it contains the form and content of the judgment "This is a cube." Thus for Kant intuitions are complex demonstrative thoughts which have implicit grammatical (and hence *categorial*) form.[5] Intuitions are conceptually formed 'this-suches': "this cube facing me edgewise," "this stone pyramid," etc. To say that conceptual intuitions are irreducible representations is to say that they provide the fundamental data for perceptual experience and that they deliver the ultimate subjects of predication for empirical judgments.[6] It is because intuitions are representations endowed with conceptual content and grammatical form that they can play this fundamental role in empirical knowledge. Thus perception cannot be decomposed into the sensing of bare particulars coupled with propositionally structured beliefs *about* those bare particulars. What is intuited is categorially determined and thus already available for propositionally structured belief.
But how do intuitions relate to sensibility, or what Sellars calls "sense-impressions"? Our perceptual reports are primarily about physical objects; they are not about not the sensory states caused by those objects and responded to by our reports. We perceive physical objects as thus and so and we deliver perceptual reports about those objects, although those reports are in part responses to the sensory states caused by those physical objects. It is important to realize that our perceptual vocabulary is developed in response to the perceptible characteristics of publically accessible physical objects and that we first have to master that vocabulary before we subsequently learn to deploy it to make perceptual reports about our own sensory states. The ability to perceive our own sensations presupposes the ability to perceive publically accessible objects. Thus the properties of sense-impressions are the postulated counterparts of the properties of physical objects, but counterparts whose properties are modifications of their models: the sense-impression of a red rectangle can be described as a "red rectangular impression" even though it is understood that strictly speaking the sensation itself is neither red nor rectangular. 'Redness' and 'rectangularity' are the models for the properties of the representing (the sensing) through which they are represented as the properties of intuited particulars (e.g., this red rectangular brick). These counterpart properties are the properties of nonconceptual representings, or sense-impressions. Sellars's account of conceptual intuition lets us see how intuited perceptual content, i.e., that which is empirically represented, is conditioned by the forms of intuition, i.e., by space and time as forms of what is conceptually represented (which is not to equate

space and time with concepts of the understanding), as well as by the forms of sensibility, i.e., the nonconceptual representings whose spatiotemporal structure is analogous to but categorially distinct from intuited space and time. Thus Sellars distinguishes between space and time as forms of conceptual intuition and their theoretical counterparts, the sigma and tau dimensions as the forms of sensory, i.e., nonconceptual, representings.[7] Crucially, it is these nonconceptual forms that guide true representings. Thus truth at the level of represented content is anchored in something akin to truth, which Sellars calls "correct picturing," at the level of nonconceptual representing. But how does nonconceptual form condition conceptual content, which is to say, meaning? In order to understand, we must first get clear about Sellars's 'non-relational' theory of meaning.

Meaning and Picturing

Meaning statements such as
'Le chat est sur le paillasson' (in French) means *the cat is on the mat* (in English)
are taken to be informative insofar as the English sentence "the cat is on the mat" means what it does because it expresses the nonlinguistic thought or proposition that *the cat is on the mat*. But for Sellars, meaning statements do not correlate linguistic items with nonlinguistic items ('meanings' understood as nonlinguistic entities, whether thoughts, propositions, or states of affairs). Rather, they correlate the linguistic function of an item in an unfamiliar language with that of a linguistic item in a familiar language—in this case, a sentence saying *that p*. Meaning statements such as:
'*Rouge'* (in French) means *red* (in English)
correlate linguistic items across two different languages by saying that they play an equivalent role in the two languages
'Rouge' in French is a ●red● in English
says that the mentioned sign design plays the same linguistic role in French as ''red' does in English. 'Red' here is not being mentioned but used in a special way: not as it is ordinarily used in English (as meaning the color red) but as an illustrating sortal in a metalinguistic assertion.
Similarly, in statements such as
a 'rouge' is a ●red●
a 'triangulaire' is a ●triangular●
'rouge' and 'triangulaire' function as *distributive singular terms* rather than abstract nouns.

Sellars's crucial contention is that metalinguistic properties picture nonlinguistic properties via the syntactical configuration of sign-design tokens. This link between metalinguistic form and nonlinguistic structure is utterly decisive for Sellars. It provides him with a way of dispensing with appeals to abstract entities in accounting for meaning. He does this by reconstructing the semantic role played by relational expressions and empirical predicates without hypostatizing them as abstract entities.

In accounting for relational expressions, Sellars's chief inspiration is Wittgenstein's claim in the *Tractatus* that we say *that aRb* by placing the names 'a' and 'b' in a certain dyadic relation. This dyadic relation is a pattern of inscription. It is the inscription that shows how a and b are related by inserting the symbol 'R' between the names 'a' and 'b'. But the relation itself is not an object. And the token 'R' that relates a and b is not a name. Thus what 'R' does in the statement 'aRb' could be done without using a symbol. Consider the statement "a is larger than b." We could adopt a convention whereby the graphic properties of the inscriptions 'a' and 'b' say what the statement "a is larger than b" says. For example:

a

b

This inscription states what "a is larger than b" states without using the expression "is larger than." But it is crucial to note that nothing in the above inscription plays the role (allegedly) played by "is larger than." That b is below a is essential to the meaning of this statement. But this graphic feature does not correspond to the role played by the expression "is larger than." Rather, in the inscription above, b's being below a plays the role played by a and b having "is larger than" between them. Thus both the "is larger than" and b's being below a are functioning here as inscriptions, which is to say graphic objects, rather than as signifying expressions. This insight extends to the semantic role played by empirical predicates. The statement "x is red," which means that object x has the property red, could be written **x**. Here it is the way in which the name 'x' is inscribed that tells us what property the object x has. The inscription **x** has two relevant features: it features a token of the name 'x' which refers to object x, and it is has a specific graphic characteristic, i.e., being inscribed in bold type. Fundamentally, Sellars's claim is that predicates do not play an independent role within linguistic expressions: "Not only are predicative expressions dispensable, the very function played by predicates is dispensable."[8] Consequently it is a mistake to abstract the role played by predicates from the role of the expressions in which they occur. It is this abstraction of a fragment of function that encourages the mistaken idea that predicates designate conceptual

properties or metaphysical attributes. The predicative role should not be reified and turned into an abstract entity called a 'property' that exists independently of sentential contexts. Still less should the conceptual property supposedly expressed by the predicate be hypostatized and turned into an ontological attribute that exists not only independently of language—as conceptual properties are alleged to—but independently of thought. As Sellars asserts: "[T]he extra-linguistic domain consists of objects, not facts. To put it bluntly, propositional form belongs only in the linguistic and conceptual orders."[9] The philosophically decisive consequence is the following: conceptual functions are linguistically incarnated in sign-designs whose material characteristics picture objects as being somehow. This 'somehowness' is *shown* not said by the manner in which names are uttered or inscribed.

An utterance or inscription by itself is of course not a statement. It is a physical pattern (phonemic, graphic, or gestural). Sellars's naturalism requires that although semantic function is logically irreducible to causal function, it is causally dependent upon it. In other words, semantic function is inoperative independently of its physical incarnation. Thus rule-governed conceptual activity, i.e., thinking, is embodied in pattern-governed regularities, i.e., physical behaviors (whether or not this embodiment is necessary, and the precise nature of its necessity are questions we cannot pursue here). Hence Sellars's "norm-nature meta-principle," according to which "espousal of principles is reflected in uniformities of performance."[10] But crucially picturing itself is not a semantic relation or function. It is a "second-order isomorphism" between objects in the natural order. It does not consist in a relation of resemblance between representation and represented; it consists in the structural equivalence between properties of relations among representations considered as natural objects and properties among represented objects. Sellars's suggestion is that conceptual properties do not designate attributes or ways of being but are nevertheless rooted in acts of representing that picture reality in ways that can be said *from within the conceptual order* to be more or less adequate.

Mapping I

Thus concepts do not represent, but conceptual function is embedded within a representational function through which representational systems map the worlds they inhabit. In other words, the roles of conceptual categories are embedded in and conditioned by the mapping function. Sellars illustrates this in his account of "robot picturing" in "Being and Being Known."[11] The robot's wiring diagram determines

transformations from sentences to other sentences in accordance with mathematical and logical principles. In addition, it must also contain the equivalent of inductive generalization such that if its tape contains sentences pairs like
Lightning at p, t thunder at p+Δp, t +Δt
And no sentences pairs like
Lightning at p, t peace at p+Δp, t +Δt
Then it prints sentences such as
Whenever lightning at p,t, thunder at p +Δp, t +Δt
In the conceptual order, which Sellars calls the order of signification, the tape pattern '::' signifies lightning and the pattern '::, 9, 15' signifies lightning at place 9 and time 15. Here we have established a functional equivalence between the Robotese sign-design '::' and the English sign design 'lightning,' as well as one between '::, 9, 15' and 'lightning at place 9 and time 15.'
But in the real order—i.e., the spatiotemporal order in which both the robot's representings and the objects represented by it exist—it is possible to establish a systematic correlation between certain 'matter-of-factual' properties of its representational states and certain 'matter-of-factual' properties of the objects that it represents. The correlation has to be established as relations between matters of facts—which is to say, in terms of a set of cognitively discernible pattern-governed regularities—because it is not God-given: there are of course any number of more or less arbitrary ways in which one could establish such a correlation (which is why Rorty and other left Sellarsians reject Sellars's picturing constraint on meaning altogether). But Sellars's claim is that the correlation is constrained by the fact that representational systems are products of their environments—thus the ways in which they can represent their environments are delimited by certain fundamental features of those environments. For Sellars, the correlation is generated by the mapping function through which natural selection obliges representational systems to generate more or less adequate pictures of their environments. Of course, the crucial questions are whether we can identify one and only one relevant mapping function and what the proper criterion of pictorial adequacy might be.
If we grant its existence, the mapping function will account for the fact that there is a systematic correlation between tokenings of '::', 'éclair', and 'lightning' in Robotese, French, and English, and instances of lightning in the world. There are matter of factual properties relating particular occurrences of these inscriptions and vocalizations to particular occurrences of lightning. This system of relations constitutes a pattern in the

causal order and it is this pattern which incarnates the rule. But crucially for Sellars, the regularities in the real order, which is to say, the regularities at the level of picturing, are the condition for the functional equivalences that obtain at the level of signification:

> *Isomorphism in the real order between the robot's electronic system and its environment is a presupposition of isomorphism in the order of signification between robotese and the language we speak.*[12]

This is to say that while espousals of principle are *logically* irreducible to regularities of performance, such regularities provide the *causal* conditions for these espousals. Thus it is not linguistic competence that provides the criterion of pictorial adequacy, but rather pictorial adequacy that furnishes the criterion for linguistic competence. This is to say that the correctness of a picture provides the criterion for gauging the correctness of a linguistic performance:

> *Linguistic picture-making is not the performance of asserting matter-of-factual propositions. The criterion of the correctness of the performance of asserting a basic matter-of-factual proposition is the correctness of the proposition qua picture, i.e.,* the fact that it coincides with the picture the world-cum-language would generate in accordance with the uniformities controlled by the semantical rules of the language*. Thus the correctness of the picture is not defined in terms of the correctness of a performance but vice versa.*[13]

What does Sellars mean by "the world-cum-language"? If espousals of principle are reflected in uniformities of performance, then "the world-cum-language" is the set of uniformities or pattern-governed regularities generated within the natural order through the semantic rules espoused by language-using animals. But note that it is the espousals that generate the regularities, not the rules themselves: Sellars cannot grant causal efficacy to rules without hypostatizing norms as abstract entities and thereby violating his own naturalism, which forbids recourse to supernatural causation. If rules are constituted through the espousals of language-using animals, and espousals are the result of training, i.e., of animals learning to conform to the rules of criticism through which they are inducted into the normative order, then whatever causes the espousal can always be explained as the effect of a regularity rather than a rule. If so, Sellars's fundamental distinction between rule-governed activity (i.e., reasoning) and pattern-governed behavior (i.e., conditioning) threatens to collapse. And without it, the attempt to ground the correctness of assertion in the correctness of picturing becomes otiose.

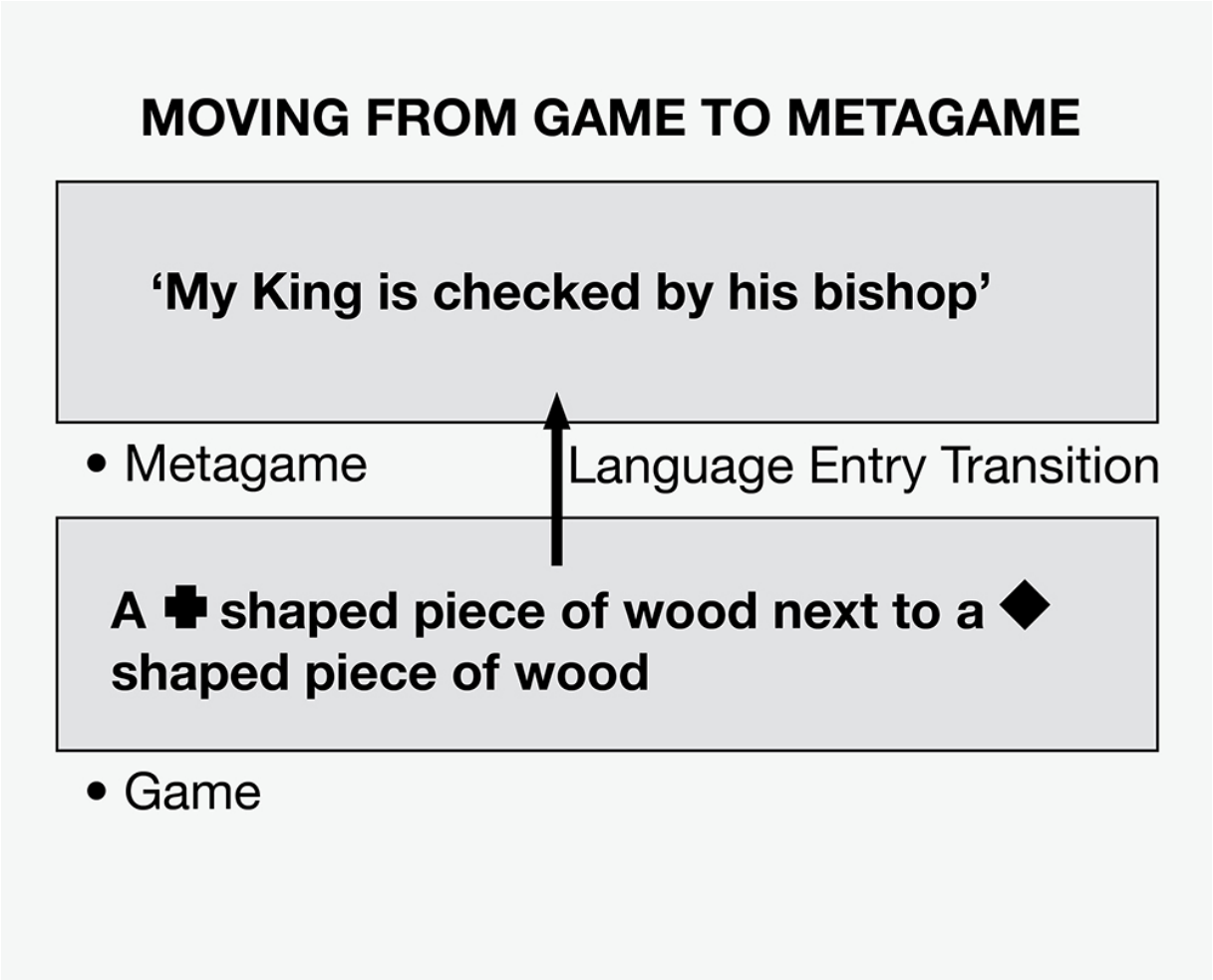
Inferring

Sellars is well aware of this difficulty and provides some of the resources required to address it. The key to his response is the idea that rule-governed conceptual competence is itself a kind of practical know-how, but one generated through cultural rather than biological conditioning. The distinction between pattern-governed behavior and rule-governed activity is not a difference in kind; rather, rule-governed activity is a *species* of pattern-governed behavior: a recursive loop generated through the interaction between complex patterns. It is a patterning of patterns; but a patterning executed through the same kinds of causal mechanisms that generate patterns in general. Sellars illustrates this idea by modeling the distinction between pattern and rule in terms of the distinction between game and metagame:

> *Pattern governed behavior of the kind we should call "linguistic" involves "positions" and "moves" of the sort that would be specified by "formation" and "transformation" rules in its meta-game if it were rule obeying behavior.* Thus, learning to "infer," where this is purely a pattern governed phenomenon, would be a matter of learning to respond to a pattern of one kind by forming another pattern related to it in one of the characteristic ways specified (at the level of the rule obeying use of language) by a "transformation rule"—that is, a formally stated rule of inference.[14]

The metagame states the rules governing the game. The rules of a language consist of the formally stated rules of *material* inference specifying the proper function (i.e., the inferential role) of linguistic expressions. Such rules can only be stated at the metalinguistic level. The rules of an ordinary game specify the permissible ways pieces in the game can be moved. These rules are explicitly stated in the metagame; they are not part of the game itself (they are not pieces in the game). But competence in the game requires competence in the metagame.

The relationship between game and metagame can be illustrated through the following diagrams. In Sellarsian parlance they represent the language-entry transition from game to metagame (perception); the intra-language transition within the metagame (inference); and the language-exit transition from metagame to game (action):


MOVING FROM GAME TO METAGAME
'My King is checked by his bishop'
• Metagame
Language Entry Transition
A ✚ shaped piece of wood next to a ◆ shaped piece of wood
• Game

MOVING WITHIN THE METAGAME

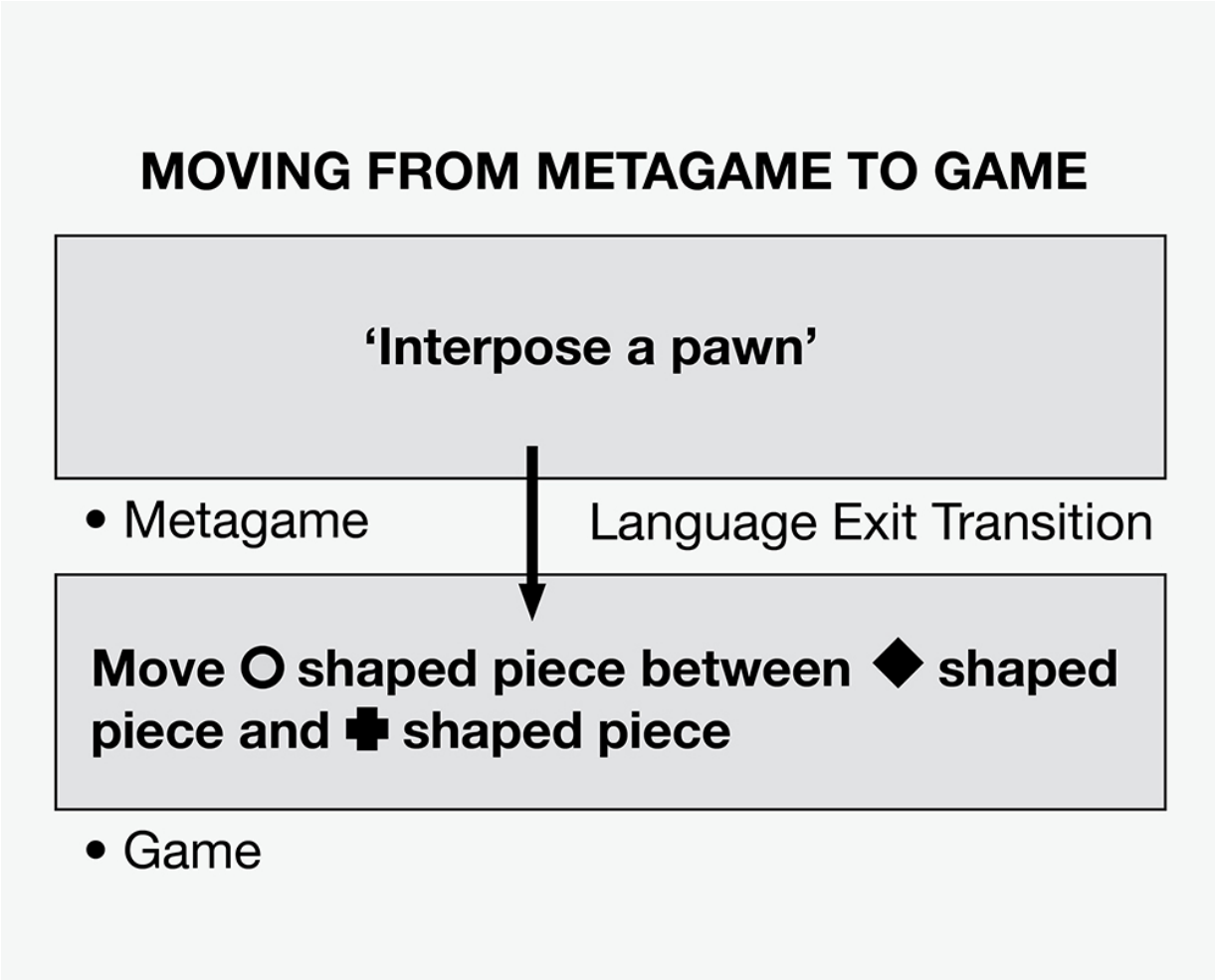
INTRALANGUAGE MOVE

'If a bishop checks my king, interposes a pawn' → **'Interpose a pawn'**

- Metagame

A ✚ shaped piece of wood next to a ◆ shaped piece of wood

- Game



Perceiving a specific configuration of♗ et de ♚ shaped pieces of wood as a bishop checking a king; inferring "If one's king is threatened by a bishop, interpose a pawn," and interposing one's pawn are all rule-governed practical competences akin to those involved in perception, reasoning, and action more generally. But perception, reasoning, and action must enable language users to find their way around in the world and satisfy their needs. If linguistic competence makes a difference in the world, language must be articulated with the world despite the fact that its conceptual structure does not directly reflect the structure of reality. Inferential competence is constrained by the need to map the world correctly.

Mapping II

But what is the criterion of cartographic, which is to say pictorial, adequacy? It is formulated using our extant conceptual categories, and as such is internal to our signifying scheme and dependent upon our available predicative resources. Yet it can still be used to track the correlation between conceptual order and real patterns. Sellars's

theory of picturing is an attempt to articulate the logical, i.e., normative-inferential, powers of concepts together with the empirical or 'matter-of-factual' characteristics of the linguistic items in which these powers are incarnated:

> *[…*T]he ultimate point of all the logical powers pertaining to conceptual activity in its epistemic orientation is to generate conceptual structures which as objects in nature stand in certain matter-of-factual relations to other objects in nature.[15]

This is the point at which the Rortyan objection raises its head. How could the "world-cum-language" or the various matter-of-factual characteristics (shape, size, color, internal structure, etc.) in terms of which we correlate linguistic and nonlinguistic items provide a criterion of correctness for linguistic assertion? Since picking out these empirical facts will depend on our conceptual resources, which are norm-governed, all we are doing is comparing facts with other facts; specifically, facts about linguistic objects with facts about nonlinguistic objects. But the criterion of correctness will be internal to our system of linguistic conventions in both cases. Facts about pictorial adequacy are just that: facts. And like all facts, they will depend on historically circumscribed fact-stating resources, just as they will be intelligible only within the extant space of reasons in terms of which we justify all assertions concerning matters of fact. Thus picturing fails to provide a truly independent, which is to say, nonnormative criterion of adequacy for the alleged correspondence between the normative and real orders. Since any mapping function correlating the factual properties of linguistic items with those of nonlinguistic items will be more or less arbitrary, we cannot use it to establish a criterion determining the degree of pictorial adequacy between linguistic assertions and nonlinguistic reality. Given the arbitrariness involved, we could just as reasonably proclaim an ever-increasing divergence, rather than convergence, between our linguistic pictures and nonlinguistic reality.[16]

Such considerations doubtless underlie Rorty's skepticism about Sellarsian picturing. But the objection misses something important. Sellars's claims that logical powers have a "point" and that conceptual activity is endowed with an "epistemic orientation" need to be taken seriously. What we know about the world is always accompanied by what we know about our knowing about the world. Empirical science is not just the accumulation of facts about the world but also (and increasingly) the accumulation of facts about *how* we know the world. These facts help us orientate ourselves: they contribute to a narrative of our cognitive evolution that develops as part of our ongoing understanding of our biological and social history. Cognitive progress is not only charted in terms of

knowledge of facts, but also through facts about knowing. And knowledge does not only develop in the dimension of cumulating facts about the world but also in the dimension of integrating facts about knowing into our knowledge of the world. The veritable *telos* of cognitive enquiry is not exhaustive description but practical transformation: the integration of knowing and doing such that what we know about the world and our place in it allows us to transform both it and ourselves in order to realize our various purposes; purposes which are not fixed but perpetually redefined in light of what we come to know.

Thus knowledge of matters of fact is rooted in logical powers (powers of inference), but these logical powers must also be understood as rooted in objects in nature bearing certain factual relations—and hence natural capacities—vis-à-vis other objects in nature. The criterion of adequacy for picturing is internal to the signifying order because it is through reasons that we formulate our purposes. We do not measure this adequacy by stepping outside the conceptual order and comparing its degree of correspondence to the nonconceptual order. Rather, we use the conceptual resources of matter-of-fact discourse to try and make material mode statements about the second-order isomorphism between the properties connecting representings and the properties connecting the objects they represent. The mapping function does not preexist this discursive activity; it is constituted in and through the discourse that seeks to capture it. The attempt to uncover causal invariances between certain features of assertions and certain features of objects is part of the activity that contributes to the determination of the function. Thus the criterion of pictorial adequacy is also practical, not just theoretical: it is formulated in terms of the degree to which what we know about the correlation between representing and represented allows us to realize our purposes in the world. The adequacy at issue here is practical and transformative, not theoretical and contemplative. For Sellars, as for Hegel, the ideal is not an inert supernatural phantasm, but something that actualizes itself in and through the real. Because we are norm-governed creatures, our performances can be judged in terms of the principles they ought to embody. Even the claim that our performances *fail* to embody these principles presupposes the authority of the ideal on which we have defaulted. In this regard, empirical facts about the systematic uniformities between linguistic items and nonlinguistic objects are still facts about objects, not about concepts. That we need norms to state facts does not entail that all the facts we state are ultimately about norms. The Rortyan objection moves from the premise that all factual properties are norm-governed to the conclusion that all factual properties are normative properties.

The premise is true but the inference is invalid and the conclusion is false. Thus there is nothing intrinsically incoherent about Sellars's claim that we can use concepts to determine the degree of pictorial adequacy that concepts bear to nonconceptual reality.

The Immanence of Representation

What can we conclude from this account? First, a lesson concerning immanence. What is transcendentally immanent is the difference between representables and things-in-themselves, not the fusion of sensing and being proclaimed by philosophies of immanence (Bergson, Michel Henry). The transcendental difference between representables and things-in-themselves is not a two-world theory (sensible/supersensible), but a double-aspect theory about a single, immanent world. The distinction between the sensible and the supersensible is methodological, not ontological. The manifest world of intersubjective experience—encompassing both the public and private domains—is empirically real in the only acceptable sense of 'empirical.' What is immanent is our corrigible, justifiable, and shared knowledge of ourselves and our world. But this means that those philosophies of immanence which begin from an experience allegedly lying beneath or beyond judgment, categorization, and representation, begin from an abstraction. The way towards absolute knowing does not lie in plunging deeper into the alleged ineffability of subjective immediacy. It starts with the reflexive stratification of immanence into representing and represented, and the gradual recognition that what we know about the latter (the represented) is conditioned in ways we don't yet know by the former (our representings). Objective knowledge remains incomplete unless supplemented by knowledge of objectivating structure. This structure is spatiotemporal in a transcendental rather than empirical sense.
Thus there are two dimensions of spatiotemporal structure: the one which we represent, and the one in which our representing unfolds. The goal of cognitive enquiry consists in incorporating ever more facts about the structure of representing into every represented fact. This would be the naturalization of the involuted spiral of absolute knowing. In this sense, spatiotemporal location provides the transcendental coordinates for our species' collective *world story*:

> *The "transcendental" or epistemic function of spatio-temporal concepts as forms of representing must be distinguished from their empirical function in matter-of-factual judgments about historical fact.*
> In linguistic terms this means roughly that spatiotemporal predicates are essential not only to object-language statements, but to the metalinguistic statements that ascribe logical (epistemic) powers to linguistic forms.[17]

It is not only what is represented that is represented as existing at a particular location in space and a particular point in time; representing itself is located in space and is actual in time—but a noumenal space and time that, although conceived as partially analogous to the space and time proper to perceptual experience, possess their own distinctive structures to be uncovered through some future alliance of physics and neurobiology. What this amounts to is the claim that the logical powers of the concepts through which we apprize spatiotemporal reality are themselves spatiotemporally conditioned. As it progresses, the history of what we know incorporates within itself more and more facts about the empirical structure of knowing. The limit of this movement would be the point at which empirical (sigma-tau) facts about the structure of knowing are incarnated in the structure of empirical (spatiotemporal) facts.

Footnotes

1. Wilfrid Sellars. "Some Remarks on Kant's Theory of Experience." *Kant's Transcendental Metaphysics.* Ed. J. F. Sicha. Atascadera, CA: Ridgeview Publishing, 2002. 271 para.13. Print.

2. *Ibid.* 269 par. 4.

3. Here I am indebted to Omar Talhouk's MA dissertation "Natura Naturans: The Concept of a Nature for Representation," American University of Beirut, 2014. Print.

4. *Ibid.*

5. Wilfrid Sellars. Op. cit. 2002. 428-429 par. 46-49.

6. This is not to say that conceptual intuitions deliver ultimate subjects of predication in the metaphysical sense. Sellars is careful to distinguish between complex particulars, exemplified by perceptual 'this suches,' and the simple or ultimate particulars sought for in metaphysical discourse. See Wilfrid Sellars. "On The Logic of Complex Particulars." *Pure Pragmatics and Possible Worlds: the Early Essays of Wilfrid Sellars*. Ed. J. F. Sicha. Atascadera, CA: Ridgeview Publishing. 2005. 140-167. Print.

7. 'Sigma' and 'tau' are the names for the counterpart properties corresponding to space and time respectively.

8. Wilfrid Sellars. *Naturalism and Ontology*. Reseda, CA: Ridgeview Publishing, 1980. 51. Print.

9. *Ibid.* 62.

10. Wilfrid Sellars. “Truth and ‘Correspondence’”. *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 216. Print. The expression “norm-nature meta-principle” is from James, R. O’Shea. *Wilfrid Sellars: Naturalism with a Normative Turn.* Cambridge: Polity, 2007. Print.

11. Wilfrid Sellars. Op. cit. 1991. 41-59.

12. Wilfrid Sellars. “Being and Being Known.” *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 57 par. 53. Print.

13. Wilfrid Sellars. *Science and Metaphysics: Variations on Kantian Themes*. London and New York: Routledge & Kegan Paul, 1967. 136. Print. (My emphasis).

14. Wilfrid Sellars. “Some Reflections on Language Games.” *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 209 par. 17. Print. (My emphasis).

15. Wilfrid Sellars. Op. cit. 2002, 275 par. 27.

16. Richard Rorty. *Philosophy and the Mirror of Nature.* Oxford: Basil Blackwell, 1980. 295-306. Print.

17. Wilfrid Sellars. Op. cit. 2002. 277 par 31-32. (My emphasis).

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The Trans-Umweltic Express

Gabriel Catren

The reading of *The Glass Bead Game* by Herman Hesse in my late adolescence exposed me for the first time to the idea of a practice intended to *compose* the different modes of exploration of the experiential field in which we find ourselves (modes such as science, art, and politics). Hesse's program—conveniently enriched with other elements, coming notably from the transcendental and post-transcendental philosophical traditions—would ultimately lead me to the characterization of the philosophical activity that I currently endorse. By abducting the way Edmund Husserl named his philosophical project—*transcendental phenomenology*—we can characterize this conception of philosophy by means of the expression *immanental phenou menodelics*. On the one hand, the term *immanental* encodes the thesis according to which the subject of the *transcendental constitution* of subjective experience is itself a product of an *immanental institution* taking place within an impersonal experiential field. On the other hand, the term *phenou menodelics* results from the amalgamation of the term *phenou menon* (which is itself a hybridization of the Kantian notions of *phenomenon* and *noumenon* denoting the programmatic absolution of philosophy with respect to any form of transcendental limitation of experience) and the suffix *-delics* (which takes the place of the suffix in Husserl's phenomeno*logy* in order to stress that the *logos*-oriented *theoretical* mode of exploration should not have—I maintain—any privilege whatsoever in the philosophical activity).

In order to explain the relation between these ideas and Hesse's program, let me start with the most primordial pheno*u*menodelical fact, namely that we are always already embedded in a *concrete* and *impersonal* field of experience. The term *concrete* is intended

here to stress that experience is always a fusion of percepts, affects, concepts, and intersubjective relations (in the most general—i.e., not necessarily human—scope of the term subject): to be there in the midst of the experiential field is to perceive, to feel, to understand, to be with, all at once, in an impure mixture. What I call an *abstract modality of experience* is a mode of experience resulting from a process of abstraction, i.e., from a process by means of which one abstracts certain dimensions of experience in order to focus attention on a single dimension. For instance, I can focus on the demonstration of a theorem by abstracting the perceptual field (e.g., the temperature of the room I am in, the visual field that surrounds me), the affective field (e.g., my current mood, the pulse of a symptomatic tic that affects me), and the social field (e.g., the actual human environment in the space where I am, the current political situation). I call the different dimensions of the experiential field that result from these abstractive procedures *plasma* (the affective field), *vision* (the perceptual field), *logos* (the rational field), and *socius* (the political field). But the experiential field *as such*—i.e., before subjecting it to the prismatic refraction that yields these various abstract modalities—is always a *concrete coalescence* of affects, percepts, concepts and intersubjective relations. Taking up Maurice Merleau-Ponty's (as well as Michel Henry's and David Cronenberg's) term anew, I call this concrescence *flesh.* The impersonal *flesh* is a solaristic *plasma* pulsed by drives and mesmerized by propagating *perceptual fields*, a deliquescent and iridescent element organized by the ingression of a *logos*, a phenoumenodelical daydream inhabited by a *socius* of experience-able (receptive) and response-able (expressive) subjective fluctuations.

Mareaciones, Extract from video (Florencia Rodriguez Giles, 2015)

In this description, I presuppose the effectuation of what we could call—in the wake of Husserl—*phenou menodelical epokhé*. The *epokhé* denotes the *existential conversion* by means of which one suspends (or puts into brackets) any thesis regarding the ultimate nature, the supposed origin, and the hypothetical destination of the experiential field. By this conversion, every pheno*u*menon is transmuted into a mere pheno*u*menodelical *datum* drifting through the impersonal stream of experience. The term *flesh* denotes the pheno*u*menodelical (im)materiality of this suspended field *in its multimodal concreteness*. The philosopher is floating within the ungrounded pheno*u*menodelical flesh; traversed by percepts, concepts, affects, languages; inhabiting a *socius* of (inorganic, vegetable, animal, human, X) subjects. We could say that thanks to the *epokhé*, the subject—gaining access to this primordial scene of the philosophical mode of being—gets philosophically stoned.

In turn, the term *impersonal* (in the expression *concrete and impersonal field of experience*) is intended to stress that this field is always in excess with respect to the particular experience of any *actual* or *possible*, *individual* or *collective*, *empirical* or *transcendental* subject. This characterization of the experiential field implies that experience is always indexed by different forms of (what we could generally call) *locality*. Experience is always the experience of an empirical subject, which is always in a particular state (e.g., in a particular spatiotemporal position, in a particular state of motion, in a particular mood,

etc.). Moreover, such an empirical subject is always a token of a particular transcendental type of subjectivity, i.e., of a transcendental structure defining the *a priori* conditions of subjective experience in both its receptive (inhaling) and expressive (exhaling) flows. Therefore, experience is always indexed by both an *empirical* and a *transcendental perspectivism*. One particular existential possibility for a subject who finds itself locally embedded in this experiential field is to explore it, i.e., to try to mediate these different forms of locality. We can always (try to) take a walk. First, a subject can start exploring the field by forcing some changes of its empirical state (besides the changes existentially imposed on it by default, such as moving forward in time), thereby changing the content of its actual experience. By doing so, the subject affords a first form of exploration of the experiential field, what we could call an *empirical exploration*. Now, thanks to Immanuel Kant we know that the empirical degrees of freedom of a subject are dependent upon its transcendental type. Borrowing Jakob von Uexküll's terminology, we could say that its possible empirical movements unfold in a certain *Umwelt* (environing world), which depends on its transcendental structure. For instance, the empirical degrees of freedom of a tick and a human being—and thereby the *Umwelten* in which they can move—are not the same. If the subject wants to radicalize the scope of its exploration beyond its transcendental-dependent *Umwelt*, it must address the task of performing transcendental variations (*trans-variations*) of the very transcendental structure that makes its experience possible. To effectuate such trans-variations means to perturb, to deform or to induce mutations of the very transcendental frame that makes its experience possible (in its conceptual, perceptual, affective, social, linguistic, sexual, historical, and cultural dimensions). So finally, what I call a *speculative subject* is a subject that, besides being able to modify its *actual* experience by changing its state in its *Umwelt*, also affords mutations of the very transcendental frame that defines the "umweltic" horizon of its *possible* experiences.

To mediate the limits of experience does not only mean actualizing new possible experiences, but also modifying the transcendental frame that demarcates the possible experiences from the "impossible" ones. To do so, mankind has constructed specialized *organons* of mediation—such as art, science, and politics for instance—as well as different forms of existential practices (like for instance gymnastical, erotical, dietetical, and liturgical practices). These *organons* generally proceed by focusing on a particular modality of experience by abstracting the others. We can mediate the limits of experience by selectively plugging into the experiential field *affectively* (by tuning with the *plasma*), *perceptively* (by tuning with the *vision*), *conceptually* (by tuning with the

logos), or *politically* (by tuning with the *socius*). The thesis according to which the different abstract modes of exploration of the field (art, science, politics, etc.) do construct vectors of *speculative* transcendence means that they do not only allow us to perceive, to feel, to understand, and to produce new phenomena, but can also force transcendental variations of the *a priori* conditions of perceptibility, affectability, conceptuality, sociability, and production. The hybrid neologism *pheno*u*menon* (which traverses the Kantian distinction between phenomenon and noumenon) is intended to stress that the "intentional" pole of a "speculative" experience—i.e., of an experience enveloping a shift of the subject's transcendental structure—is not an objective phenomenon constituted by the subject, and thus placed in a transcendental-dependent *Umwelt*. Rather, the pole of a "speculative" experience is a trans-umweltic configuration of the experiential field—i.e. a pheno*u*menon—that appears in each *Umwelt* under the form of a particular objective phenomenon.

For instance, theoretical reason (of which science, in the restricted sense of the term, is a particularly sophisticated form) is a particular mode of exploration that tries to expand our *rational* understanding of the different kinds of pheno*u*mena that inhabit the experiential field (e.g., formal, physical, biological, and sociological pheno*u*mena). Theoretical reason explores the experiential field by means of an experimental and theoretical *organon* that *selectively* focuses on the *perceptual* (in the experimental-technological sense of the term) and *conceptual* modes of the field to the detriment of the other dimensions (such as for instance the affective or the political dimensions). We could say that science has expanded the doors of (technologically mediated) perception and (formalized) conceptualization through the abstraction of other possible modalities of exploration. In order to mediate the limits of our understanding, theoretical reason cannot proceed by just applying the same toolbox of conceptual categories, linguistic structures, and techno-perceptual resources to new experimental data, but it also has to modify—when necessary—the very transcendental framework of linguistic expression, formalization, schematization, conceptualization, and technological perception.

According to what we have said, art, science, and politics (among other possible practices for the expansion of experience) operate differential transgressions of the (empirical and transcendental) limits of human experience by stalking the trans-umweltic interzones of the impersonal experiential field. Now, by following Hesse's main intuition, we could try to carefully define, construct, and activate a single concrete *organon* of exploration of the experiential field capable of *composing* these different abstract sounding lines of

mediation. The program of constructing this trans-modal *organon* is (according to its definition) much more radical than the program of performing transversal compositions that are *internal* to each abstract modality, such as for instance the interdisciplinary collaborations between different *scientific* disciplines or multimedia integrations of different *artistic* practices. Since philosophy has historically provided the most radical attempts to put science, art and politics on a single plane of compossibility (such as for instance in the works of Plato, Aristotle, Kant and Hegel), I took the decision—in the wake of Badiou—to keep the term *philosophy*—or more accurately, in the terms of the Jena Romantics, *symphilosophy*—to designate this concrete *organon* of mediation. However, this terminological decision is not blind to the fact that the current practices of philosophy do not faithfully enact this trans-modal composition, notably because of the fact that philosophy has never (or very rarely) put into question the canonical form of philosophical expression and production: philosophers have always written books in which they speak *about* science, art and politics, rather than creating *organons* of exploration *effectively* entangling scientific, artistic and political procedures. We could say (by adopting a Marxist phrasing) that philosophers have hitherto only thought about the compossibility between science, art and politics; the point, however, is to concretely effectuate this composition.

Mareaciones, Extract from Video (Florencia Rodriguez Giles, 2015)

Certain extended forms of art have provided examples of trans-modal programs and strategies for inducing *concrete* modes of exploration of the experiential field, notably by producing—in the wake of the speculative romanticism (see for instance *The Oldest Systematic Program of German Idealism* of the classmates Hölderlin, Hegel, and Schelling)—aesthetico-theologico-political knots. We can think for instance of Stéphane Mallarme's attempt to put poetry at the service of a forthcoming secular ceremony (modelled on the Catholic Mass) in which the "crowd" will recognize itself; of the project of a *gesamtkunstwerkian* piece capable of enveloping existing artistic disciplines into a single "total(itarian?)" (political-)artwork trans-modally connected (at least programmatically) to the utopian project of staging a mythic scene for the institution of a new political subject; or—in another zone of the political spectrum—of Walter Benjamin's and Bertolt Brecht's attempt to counteract the fascist "aestheticization of politics" by means of a "politicization of arts". More recently—like for instance in Joseph Beuys' *social sculpture* or in the framework of the so-called *curatorial turn* (notably launched by Harald Szeemann, the curator of the exhibition *Der Hang zum Gesamtkunstwerk*)—artistic practices have concretely addressed the problem of blurring certain boundaries (such as for instance the boundaries between art and daily existence; between stage and audience; between presentation and representation; between original and copy; between artist and curator; between container, context, and content; between production process, product, display, and theoretical reflexion) in order to induce trans-modal connectors between artistic, social, existential and theoretical practices. Philosophy, as I understand it, has to carefully evaluate these trans-modal projects as well as their possible impasses and dangers (we can think for instance in Philippe Lacoue-Labarthe's critical assessment of the onto-typological conception of politics in terms of a fictional myth, or in Hans-Jürgen Syberberg's controversial thesis according to which it is necessary to "redeem" the Wagnerian project of a *Gesamtkunstwerk* from the instrumentalization implemented by the Third Reich) in order to adapt and adopt—when considered convenient—some of their strategies.

In any case, the philosophical *Glasperlenspiel* cannot be understood as a *Gesamtkunstwerk* for the following reasons. First, it is not the task of the philosophical composition to produce a total work *of art*, i.e. to produce mediators of the limits of experience under the aegis of the aesthetical interest of reason. In order to attain a full-fledged philosophical transversality and span a truly trans-modal space of compossibility, artistic practices in the restricted sense of the term should play no privileged role, and no mode of exploration—such as theoretical reason in its most sophisticated forms—should be

excluded. Second, it is not the task of the philosophical composition to produce a *total* work of art: the trans-modal philosophical organon—far from providing an overarching position capable of totalizing the abstract modes of thought —acts horizontally, within the "plane" occupied by these modes, by trying to *locally* synthetize abstracts procedures of exploration into concrete mediators. Far from occupying a position of domination—and far from believing that the multiplicity of abstract modes of thought could be the object of any totalization whatsoever— philosophy has to defect its supposed self-sufficiency and humbly submit itself to the irreducible sovereignty and multiplicity of these modes. Last but not least, the speculative subject that operates the philosophical probes aims to be an *untyped* subject, i.e. a subject absolved from the transcendental onto-typologie that pretends to condemn the subjects of experience to be tokens of a unique transcendental type.

Now, this leads me to another important obstruction to the activation of a truly philosophical *organon* of mediation, namely the "sutures" (to use Badiou's terms) between philosophy and these abstract modes of exploration, such as for instance the suture between philosophy and science (e.g., Husserl), the suture between philosophy and art (e.g., Heidegger), or the suture between philosophy and ethics (e.g., Levinas). The definition of philosophy as an *organon* of concrete composition requires absolving philosophy from these "sutures". Philosophy shares with the abstract modes of exploration their vocation to transgress the (empirical and transcendental) limits of human experience, but it must counterbalance their inherent tendency to abstraction, to depart from the multi-modal concreteness of the experiential field in order to focus on a single abstract modality. Philosophy—in this forthcoming enhanced form—can be understood as a higher form of synesthesic exploration directly plugged into to the flesh as such: philosophy does not only compose different *sensory* vectors of mediation (visual, acoustic, etc.) into synaesthetic sensoria, but also affective, conceptual, existential, and political ones. We could say that philosophy enriches the trans-umweltic directionality of the different abstract vectors of exploration with an inter-modal degree of freedom. The trans-modal vocation of such a philosophical *organon* implies that it should not establish any privileged identification to any abstract mode of experience, be it art, science or politics. In other words, no abstract mode of exploration can pretend to occupy a privileged position in the philosophical space of compossibility, that is to say an overarching position from which it could subordinate or dominate the other modes. In particular, science (or, more generally, theoretical reason) is nothing but one particular modality of experience, a mode of experience that focuses on the expansion of

conceptual and techno-perceptual experience. As such, science is an important ingredient in philosophical composition. However, any form of identification between science and philosophy, any attempt to understand philosophy as a science of sciences (Fichte), as a first or "rigorous" science (Husserl), or any definition of philosophy as a *theoretical* mode of thought defined with respects to the supposed (transcendental, etc.) limits of science betray the trans-modal nature of the philosophical exploration. It is not the task of philosophy to conceptually understand the *logos* that inheres the experiential field: the task of not giving up on the desire to understand the rational structure of the experiential field—be it at the ontological, transcendental, or ontic levels—is the defining prerogative of science (in an extended sense of the term).

In particular, we can provide a new meaning to the expression *philosophy of X* (as in philosophy of art, philosophy of science, etc.): the application of the philosophical *organon* to any abstract mode of exploration requires addressing the latter in its full concreteness. Even if a mode of exploration is oriented by a particular interest of reason (theoretical, aesthetical, political), this does not eliminate the fact that it is a concrete human activity endowed with a multi-modal richness. For instance, mathematics is oriented by a theoretical goal (to expand our rational comprehension of formal—geometrical, algebraic, numerical, etc.—structures); but it is also a concrete human activity undertaken by concrete human beings embedded in a concrete experiential field, and therefore an activity endowed with aesthetical, political, and affective dimensions. And these dimensions open communicating vessels that discretely connect mathematics to the other abstract modalities of exploration. Hence the expression *philosophy of X* does not mean that X is itself considered an object of a *theoretical* meta-discipline—e.g., epistemology, aesthetics, etc.—(in this sense, as Louis Althusser claimed, philosophy has no object), but rather an activity intended to reinsert an abstract mode of exploration in the concreteness of its effective practice, thereby opening it to possible alliances with other modes of exploration, alliances that might finally compose concrete mediators of the limits of experience. This reinsertion of an abstract sounding line of exploration within the concrete experiential field should counteract what we could call the *pathologies of abstraction*—that is, the tendency to hypostasize or isolate a mode of exploration by forgetting its intertwining and its dependency with respect to the other modalities (e.g., the dependency of—even the purest form of—scientific inquiry upon politics).

In Hesse's novel, this risk is explicitly addressed under the form of Father Jacobus's criticism regarding the isolation of Castalia with respect to the rest of the world, its ludic aestheticism, its high-culture elitism and its historical detachment. Strictly speaking, the Glass Bead Game—in its ludic, elitist, and isolated existence—still misses the philosophical project of activating an *organon* of trans-modal composition. In this novel, Hesse accomplishes the transition from the description of a single individual's formation and maturation explored in his previous works—fully inscribed in the tradition of the *Bildungsroman*—to the description of the development of an institutional collective subject, more in the wake of Oswald Spengler's *Decline of the West*. This transition is required by the very ambition of the project: the construction of an *organon* of composition capable of entangling the different abstract modes of mediation produced by mankind cannot be carried out by a single individual. However, the resulting collective subject still finds itself in a state of relative isolation, in the sense that it has uprooted itself from the human community at large and more generally—we could add—from the phenoumenodelical field of life, from the *socius* in all its human and non-human forms. In this way, Hesse explicitly (and maybe self-critically) acknowledges the impasses of the Glass Bead Game project, impasses that ultimately lead to Knecht's decision to defect from Castalia, to counteract its purist and academicist transcendence, its ascetical retreat, its egotistic ludic monadology, its lack of historical and political engagement.

Mareaciones, Extract from Video (Florencia Rodriguez Giles, 2015)

In order to conclude, I would like to stress the importance of a comparison that subtends Hesse's novel, the comparison with music. By paraphrasing Mallarmé, we could say that *we find in Music several techniques that seem to us to belong to Philosophy; we reclaim them*. Music operates a synthesis of (what I consider to be) two essential registers of philosophical labor: *multi-modal composition* and *trans-individual concertation*. Music has the capacity to construct cross-modal vectors of exploration of the pheno*u*menodelical flesh by composing *formal sructures*, *perceptual qualities*, and *affective resonances* on the one hand with the capacity to induce a *collective* (and thereby political) *attunement* on the other. Regarding this last dimension of music, I think that philosophy can also be understood as an operator of trans-individual concertation in the following sense. A philosophical composition—far from being an end in itself—is an operator intended to force a differential concrete mediation of the *transcendental* limits of experience. A speculative subject is a plastic subject that can explore the experiential field by successively embodying different transcendental viewpoints, a subject that can afford (at least in principle) inter-kingdom, inter-natural, inter-cultural, inter-species, inter-nebular becomings. Now— as Husserl taught us—the fact that we can turn around a cube implies that the subjective experience of the cube is always more than the perspectival experience of one of its profiles. Since the degrees of freedom of an empirical subject allows it to take a walk in the corresponding *Umwelt*, the intentional pole of its experience is the *objective* cube as such, in the projective synthesis of its multiple profiles. We sublate the visual perspectivism of experience by the simple fact that we can take the position of any other subject in the corresponding umweltic space. If one now extends the subject's degrees of freedom by including variations of its transcendental structure, the subject acquires the possibility—at least in principle—of having an experience of the *pheno*u*menal* cube as such, in the projective synthesis of (at least some of) its multiple phenomenal objectifications.

We could say that the speculative subject that pilots such a Trans-Umweltic Express can actualize *multiscopic* modes of experience in the sense that it can synthesize multiple transcendental standpoints. This speculative multiscopicity goes hand in hand with a diffusion of the subject's localization: a speculative subject is a smeared form of subjectivity that, far from being sharply localized, is distributed through a certain region of the space of possible transcendental structures. At a purely physiological level, the brain is capable of *synthesizing* the visual information separately provided by each eye in order to produce a *single* visual experience. Now, since the eyes occupy different spatial

positions the resulting binocular vision does not have, strictly speaking, a well-defined focal vantage point. And this lack of a sharp localization induces the three-dimensional depth characteristic of human optic experience. We could even conceive a multiscopic generalization of binocular vision given by a spatial distribution of multiple eyes and a brain-like *organon* of synthesis capable of producing a single visual experience endowed with higher forms of depth perception. In the same way, a speculative experience cannot by definition be carried out by a token of a unique transcendental type, i.e. by a subject sharply localized in the space of possible transcendental structures. Now, the resulting *untyped* modes of subjectivation, by affording the task of sublating the transcendental perspectivism, are more prone to inhabit the immanence, to activate new speculative forms of depth perception, affection and conceptualization. The higher the degree of trans-umweltization of a speculative subject the lower the extent to which its experience is subjectively lived as a form of intentional *transcendence* unfolding from a sharply localized subjective vantage point to a constituted object. In short, the *trans-umweltization* of a subject's experience goes hand in hand with its *immanentization*. The process by means of which a speculative subject groks the experiential field points towards its impersonal and a-perspectival limit: a completely trans-umweltized experience is a self-experience of the pheno*u*menodelical flesh itself, an immanent self-experience deprived of any form of transcendence, a collective no-body's experience of no-thing. By paraphrasing Hesse, we could say that *the esoterics of the glass-beadical organon points down into those depths where the pheno*u*menodelical flesh eternally breathes in and out, sufficient unto itself,* in the ebb and flow of its immanent self-experience. In this way, the philosophical labour enhances the mutual attunement of a multiplicity of consonating subjects that imbricate their experiences in a collective immanent self-experience. We could say that the "musaical" scope of symphilosophy is given by the fact that it puts the inter-modal *composition* at the service of an immanence-oriented *concertation*. This collectivisation of experience, this weaving of a pheno*u*menodelical community—far from depending on an identification with respect to a mythical (transcendental) type—stems from the speculative trans-typification of subjectivity.

This text is based on a conversation conducted by Jeremy Lecomte for Glass Bead.
Some of the topics addressed in this interview were developed in Gabriel Catren. "Pleromatica o las Mareaciones de Elsinor." *Nombres. Revista de Filosofía* (29) 2015. Web. (http://revistas.unc.edu.ar/index.php/NOMBRES/issue/archive) A shorter version of this text was published in Sonia de Sanctis and Anna Longo, eds. *Breaking the Spell. Contemporary Realism under Discussion*. Mimesis International, 2015. Print.

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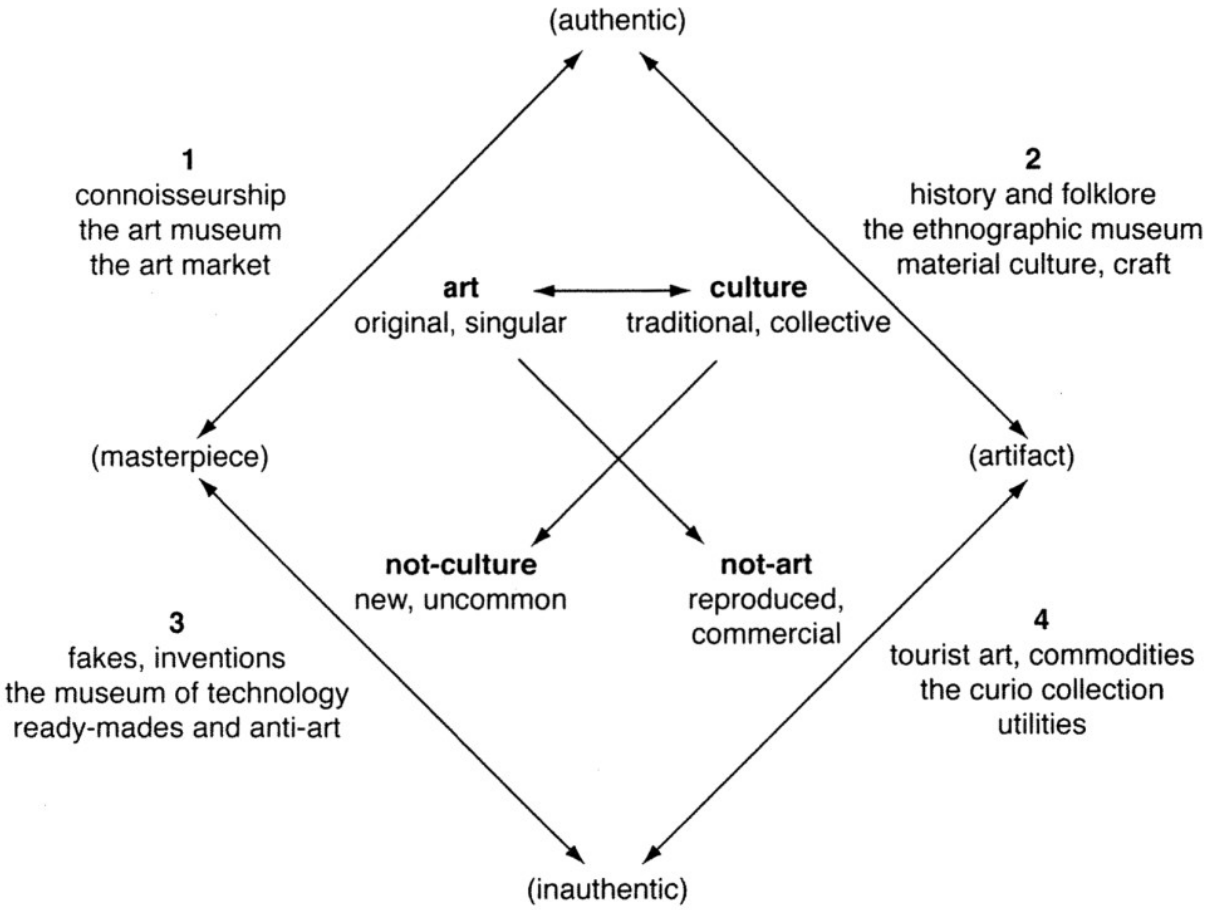
The Third House

Anselm Franke

How does the exhibition as a medium partake in the ontological partitions of modernity? This question seems particularly relevant in a time when it has become urgent to put curatorial practice on new conceptual ground—a fundament that is not limited to art history, but instead is capable of re-contextualizing art history itself against materialist social histories and a multiplicity of modern media-technologies and boundary-making practices. It is a question that is also important in a moment where thingness and object-oriented ontologies have considerable influence on artistic and exhibition practice. For my part, I consider the medium of the exhibition a possible *ontographic* device–a medium that is particularly well-equipped to deal with the ontological separations of the modern age (and perhaps only the modern age); the production of both subjects and objects, without ever taking their existence for granted, but engaging with their emergence from a "middle ground" where we find media and images situated at a tilting point, where object and subject become *Kippfiguren* (multistable images), and the forces of poeisis and pathos enter into relations of reciprocity and create a meridian of mediality, giving access to a possible vertical history. To disappoint the speculative realists of the first hour, the exhibition, I think, is not a place where one could ever hope to leave the correlational circle, the reciprocal conditioning of consciousness and world, subject and object. Instead, it allows us to interrogate the conditions of mediation and separation within correlational circles: an exhibition can take us to the foundations and the limits of those circle(s) because it can explore the thresholds of the correlation between consciousness and form.

My argument for the medium of the exhibition as a place that is particularly suited to a complex analysis of borders and frontiers across different epistemological registers, and as a place where both cognition and aesthetics partake and enact frontiers, is perhaps substantiated by the following effort, in which I test whether and how the exhibition can positively figure in the "Constitution" of modernity as proposed in an influential model by Bruno Latour in 1993.[1] This model tries nothing less than to sketch up the ontological partitions of modernity—providing a diagram of the constitutional separations that made modernity modern, both within (modern institutions) and without (the difference that would become now inevitably "pre-modern").

In Latour's graph, there is no place for the institution of "art." I therefore begin by looking at a related diagram: in 1988, James Clifford sketched what he called the Western "Art-Culture System" as that which has been operative in Western institutions, within a fourfold semiotic graph unfolding between "art" and "culture" at the top, and "not-culture" and "not-art" at the bottom. "Art" is qualified as original and singular, the product of an identifiable author, validated by connoisseurship, museums and the market; whereas "culture" is collective, traditional, and validated by history, ethnography, material culture and crafts. The two poles share a common value-orientation towards the "authentic," while they are separated by the "masterpiece" on the side of "art," and the "artifact" in the case of "culture." On the lower part of the graph reads "not-art" and "not-culture"; not-art being the commercial, the reproduced, tourist art, or commodities, and not-culture being the "new and uncommon," which includes radical artistic gestures in the moment when they are not yet accepted as "art," but above all, includes the entire realm of technological invention, insofar as it somehow constitutes a surplus with regards to the mere "commercial"—and, we might add, functional—sphere.[2] Between the poles in the graph there is of course movement, as when things of cultural value such as so-called "tribal objects" are suddenly granted the status of art, or when previously "low," inauthentic art is uplifted in a similar fashion. Movement in the inverse direction occurs whenever works of art are culturally and historically contextualized. Indeed, movement in the graph constitutes a great deal of canonical history in the field. It is as if "history" itself consists of exploring the possibilities of movement and transformation within the matrix.



"Art-Culture System: a Machine for Making Authenticity", diagram by James Clifford (From The Predicament of Culture: Twentieth Century Ethnography Literature and Art Harvard University Press, 1988).

But such a description of the "economy" of internal divisions and hierarchies in art can gain further contours by being placed and described within the schematic systems of knowledge disciplines and the division of labor of modernity itself. It then becomes possible to define more specifically the boundary-making practices in which art is immersed. What Clifford attempted for the "Art-Culture System," Bruno Latour attempted to do for modernity, particularly with respect to the pertinent division between the natural and the social sciences. In his book *We Have Never Been Modern*, Latour does not simply expound another Greimasian semiotic square from a structuralist bird's-eye view. We may suggest that he aspires to account for the onto-genesis of the modern categories from a point of view of an anti-reductionism—a terrain where received categories are already undermined. And, indeed he does not have to look for a subterranean realm where these categorical crossings and transgressions happen, as it were, by night; he looks instead at the newspapers, and turns to the sky, using the ozone hole as an example of an "object" that cannot be defined as being either purely social,

natural or discursive but instead constitutes a paradigmatic "hybrid" made of politics, nature and society alike. And what a hybrid that is and has since become, if we only think of the way "nature" has entered into "human" history once again through climate change. Latour searches for the zero-point of the division that has held modern thought in an iron-grip: the division between the natural world and society; which translates, by extension, into the division between primary and secondary qualities, *res extensa* and *res cogitans,* and the standard dualist metaphysics of everyday instrumentality based on the mind/body split. He distances himself from the narrative of the division of labor and the differentiation of functions in modern society, into the separate realms of politics, economy, the law, science, art, and mass media, and above all, from the assumption of a fundamental division between nature and culture, of a separate physical environment and society. He instead describes the coming-into-being of the relative categories nature and culture, or subject and object as poles, as if from the middle, along a continuum from relative stability to mobility and a horizon of "the event"—a primordial event (or never-ending series of events) where, with Michel Serres, "the object as such constituted the human subject."[3] In the role of the anthropologist who brings anthropology "home from the tropics," he focused on networks in which agencies are entangled and distributed among human and nonhuman actors and organized by narrative structures. Its self-description in terms of a gradual disentanglement of the natural and the social, the subjective and the objective, by means of which humankind breaks free from the chains of nature to the degree that it produces objective knowledge of nature's (fundamentally indifferent) laws, Latour claims, has been taken in by self-deception. This momentous self-deception has been the result of a gigantic effort of "purification" of the social and the natural into increasingly separate domains—an effort whose official languages have systematically obscured the "work of translation," that is, the terrain of mediation, which Latour calls a "middle kingdom," "as vast as China and as little known."[4] What differentiates modernity from the non-modern is thus neither the work of translation nor its scientific-technological configuration, but a strange renouncement of the "collectives" that are formed from material, social and discursive entities. This *renouncement* is the price that is being paid for the "purification" of nature and culture into the separate categories of the human and the nonhuman, scientific objects, and political subjects.

Latour describes the "modern constitution" as being based on two interrelated "great divides": the first between subject and object, or social and natural, which are each to be purified in their respective domains; and the second divide that separates this realm of

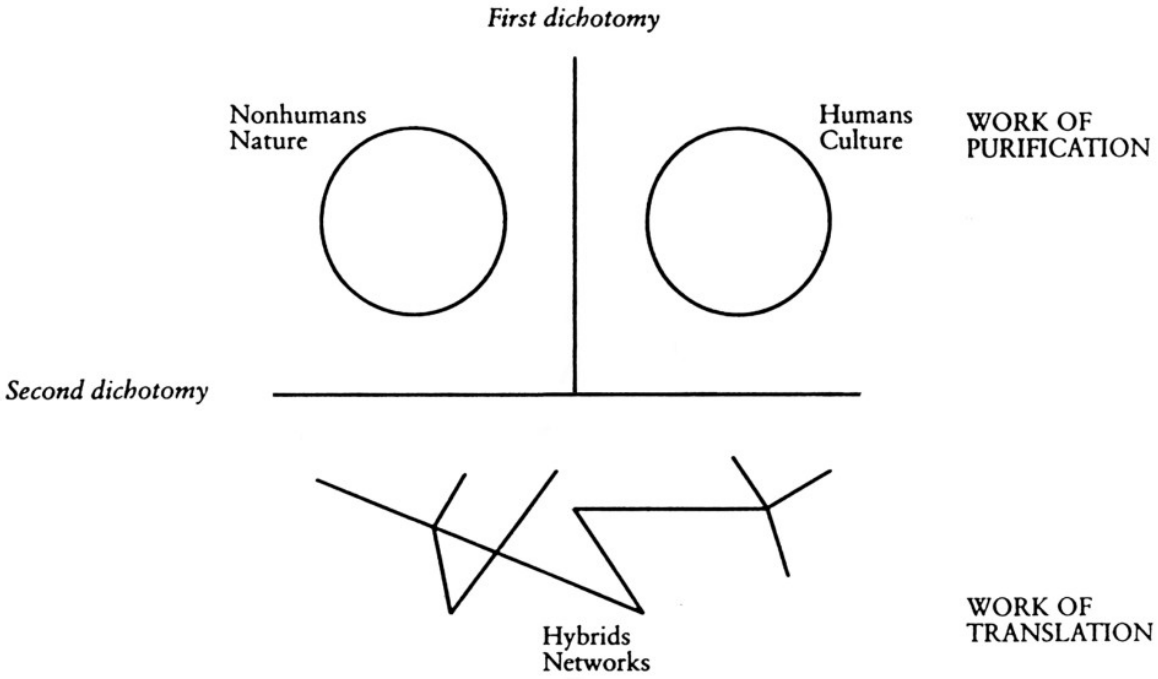
"official representation" from the work of mediation and translation in which "hybrids" are produced (these encompass the religious just as the technological, and their corresponding forms of subjectivity). But this realm, this so-called "middle kingdom," is foreclosed from "official" representation. "Everything happens in the middle, everything passes between the two, everything happens by way of mediation, translation and networks, but this space does not exist, it has no place. It is the unthinkable, the unconscious of the moderns."[5]

Latour may be at his most controversial, contradictory and amusing where his heuristics of networks turns into a psychogram of "the moderns," where he seeks to describe the leap, the sleight of hand, the propaganda through which this disavowal of "hybrids" occurs. For that seems to require that "the moderns" not only "see double" and talk in "forked tongues"; it evolves in a matrix of mutually exclusive and internally contradictory "options" provided by the "constitution" as if on a playing field:

> *A threefold transcendence and a threefold immanence in a crisscrossed schema that locks in all the possibilities: this is where I locate the power of the moderns. They have not made Nature; they make Society; they make Nature; they have not made Society; they have not made either; God has made everything; God has made nothing, they have made everything.*[6]

The result is that mediality and the social nature of relations between people and their environments is permanently being eclipsed, made to disappear as if by a slight of hand, "and they can never be caught red-handed."

Latour speaks of two official systems of representation that are erected on the grounds of the unrepresented and disavowed hybrids: political representation for subjects and society, and representation "in the laboratory" by science alone for the true, purified "speech" of objects and nature, now speaking the language of facts.



"The Modern Constitution", diagram by Bruno Latour (From We Have Never Been Modern, Harvard University Press, 1993).

Are not the two lines of division in this diagram, one horizontal and one vertical, corresponding to different kind of imagery, as if they could also be conceptualized as screens? Are images not what emerges exactly at the sites of these divides, crossing and organizing them at the same time like mediating boundaries?

What kind of image then corresponds to the "first divide"? It is an image, or better: a condition of the image as eternally torn between the subjective and the objective, either conceived as illusionary-projection or as documentary, truthful representation. Latour's crisscrossed scheme indeed also manifests itself on the level of the image: the image as a middle ground that is disavowed, for we can only ever think of the image as either entirely subjective or objective.

It is important to recall the core of Latour's thesis, namely that the two "upper" halves of the divide are the product of one and the same division, and that it is indeed the division that produces both poles as an effect. They are the mutually exclusive and recursive production of a border-making practice, whose product is paradoxical, an internally divided and contradictory matrix "that locks in all possibilities." Taking Latour's model to its conclusion, we can say that they posit subject and object as *Kippfigur*. It is precisely a recursive production of a reversible figure and ground, where we can exchange between

two perspectives, but can only ever see one as figure at any given time, while the other must recede into the supporting back-ground, the "milieu", that makes its interpretation in the terms of a "seeing as" plausible. It is perfectly possible to trace this character of the *Kippfigur* with regards to the ascription of the image either to the realm of the objective or subjective in debates on iconoclasm, as Latour has done,[7] or in debates around the status of photography and its role in legal forums.[8] Images, too, must take sides: as neutral windows adequately representing the objective world (by way of divine or machinic inscription producing an uncontaminated mimetic accuracy that reduces the deceptive to a minimum), or as mere subjective representations, with no claim to an objective world; that is, in the last instance, as an "animated mirror" of sorts.[9]

And what about the second divide—the one that divides the realm of purification from the "unconscious" realm of mediation and hybrids? This second divide appears as a screen of forever murky imagery, a theatre of defense and appropriation, the imaginary figuration of the constitutional outside: the barbarian, the animal, the man-machine, Donna Haraway's "monsters." Here, the advancing frontier of modernity produces the spectacle of its negatives and its "exports" into the outside: of the primordial and archaic past, the "irrational" colonial outside, and of a techno-utopian or dystopian future. It is a screen which acts both as a mirror and a window, operating the limits of "symbolic order," whose "outside" appears as a variously metamorphic, projected ontological anarchy, or as a diabolic realm of partial objects, spectrality and monstrosity. It is at this divide that the small and grand border-dramas of modernity are formed. In fact, all the aesthetic genres known to us partake in its logic of liminality, and it is the basis on which they turn into the formative scripts of its frontier-mythologies. All human societies, it appears, are formed by such a limit, drafted as a circle drawn by the social contract into the not-yet divided terrain of sociability, instituted as a negative that is folded up within, creating in turn a highly organized and yet anarchic realm that acts as the imaginary outside which the very distinctions that organize this society within break down.

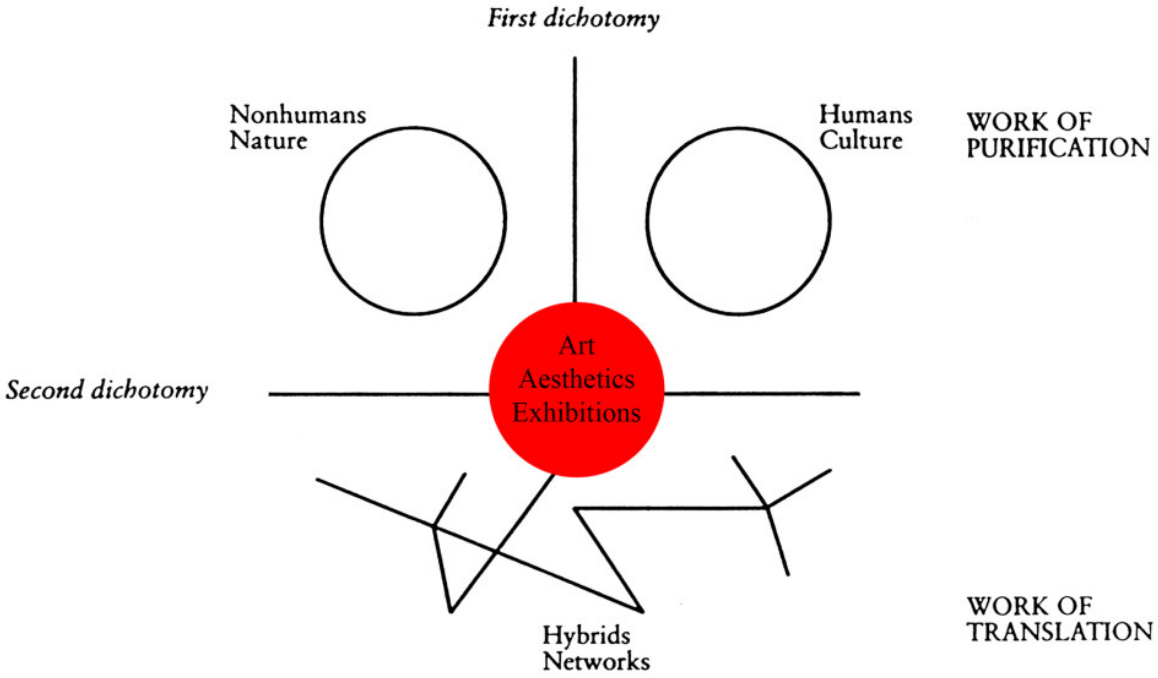
In 1993, Latour declared the crisscrossed schema of the constitution and the system of divisions of modernity as ultimately bankrupt. The hybrids that this system allowed to proliferate, he says, have overwhelmed the realm of purification – one symptom of which is the ecological crisis, where society, nature and technology are all hopelessly interlaced. The very fact that he could delineate, in 1993, the entire constitution including its (excluded yet proliferating) "unconscious," finally, is proof of its collapse: for within the registers of the constitution, delineating the very relation between purification and hybridization/mediation was allegedly anathema and could hence not come into view.

The constitution, according to Latour, forbade the "official" representations of hybrids, in order to destroy and develop them. It could only represent them as objects yet-to-be-purified.

But at the very site where there two divides meet, has there not been this most marvelous stage, where all the contradictions of the scheme came to be "officially" dramatized? An institution which appropriates, hosts, and articulates the different kinds of hybrids and images I have outlined above? Is this not a space of "official mediation," of "represented hybrids"—the space of the museum? A peculiar space that had been granted the rights and the power to represent "hybrids" officially, assigned to act as what I might refer to as an *ontological quarantine*. At middle of the diagram there ought to be *the medium of the exhibition*. It is the always-contested "space of the arts" with its many internal partitions, also the space where "others" are represented and come to be taken possession of by being delivered to visibility. It is the "official" site of the curious hybrids of the pre-moderns, and of technology—for instance, the very categories we find in Cliffords' graph.

This is of no small consequence because, if we follow Latour, the representation of hybrids had to be rendered impossible in order for the modern constitution to work. Perhaps this explains why there was ever belief in the "arts" to have the potential to either transcend and reconcile, or blow up "modernity" from within? But if the "space of art" did not implode the system of modern divisions as if from within, it was because it was circumscribed by a secret contract, a magic circle still inscribed today into institutions of art—the very contract that granted art its relative autonomy, acquired at the price of its worldly consequentiality. Everything that enters into the magic circle has to be removed from the world, removed from direct effect, entering a realm of the merely symbolic, the merely fictional. All objects in the magic circle are given a special ontological status and undergo a process of neutralization through a paradoxical fictionalization. This is what the term "ontological quarantine" designates—in just the same sense that Frederic Jameson has suggested "the aesthetic" to figure as a "safety valve," "a kind of sandbox to which one consigns all those vague things … under the heading of the irrational … [where] they can be monitored and, in case of need, controlled".[10] Yet on the other hand, this has allowed a unique space of cultural-semiotic reflection to emerge in which certain attitudes and subject-dispositions may be tested and produced, although the passage from the condition of a "test" to reality has ever since been a battlefield.

The very category of art and the aesthetic did not exist as such prior to the emergence of this "settlement"—the very implicit ontological partitions that underlie the status of art and the cultural object in modernity. The contract that brought relative freedom acquired at the price of inconsequentiality is constitutive of the magic circle that surrounds art and its special ontological status in modernity. And this magic circle has, of course, been a major object of contestation, such that much avant-garde history consists of attempts to break the contract, and thereby exit its spell.



Amended diagram of Bruno Latour's diagram of "The Modern Constitution".

Indeed the institution of art and the museum, as well as the conceptual designation "aesthetics" has to be situated right in the center of diagram, and hence at an imaginary crossroads of the modern ontological partition: a "Third House" next to "human culture" and "nonhuman nature." A third house, burdened with the impossible, yet definitely interesting task of purifying not objectivity or subjectivity, matter or mind, society or nature; but whose most noble modern mission (as in the logic of modernism), was to purify mediation and mediality: hence "medium-specificity" as a formula of progress (i.e., purification) in the arts. And of course this paradoxical task would be impossible without

the inexhaustible resource of unpurified mediation-in-excess: hence all modern art history, in the words of Marshal McLuhan, is nothing but a never ending "crescendo of primitivism".

What happens when this "Third House" is superimposed onto the diagram is a series of more or less predictable as well as surprising correspondences: the upper half of the circle corresponds to the left side of Clifford's semiotic square—the side of the artistic masterpiece that stands for the subject *par excellence*, and the side of the extraordinary hybrid, the technological invention. On this upper half of the circle, we find museums that reflect the Western "self." Towards the lower half of the circle, we may locate the museums of "culture," of the artifact, and the non-modern other; and we may also locate other forms of exhibitions there, such as the commercially circulating hybrid at fairgrounds, the spectacle of the World Expositions, and so forth.

While being overtly schematic, the graph thus has its advantages. It renders comprehensible that—while being internally structured by both schisms whose interplay is, following Latour, at the heart of the modern boundary-regime—the red circle in the middle functions as a unique apparatus in which modernity is believed to be synthesized, and its cleavages can eventually be overcome. This is the reason for the otherwise rather inexplicable investment that brilliant social critics of modernity (from Max Weber and Georg Simmel to Georg Lukács and the Frankfurt theorists to name only a few) made in aesthetics and art—inexplicable, because of the stunning asymmetry of power between the arts and what they saw as their adversary, the divisive instrumental reason and objectivist rationality of the science-and-technology driven modernity whose partitioning of the sense and experience they were critiquing. In this "Third House," so centrally located, they seemed to believe, the wholeness of experience (as first described by Friedrich Schiller) could be preserved, and one day it would emerge from there not merely as an isolated zone of a shamefully granted autonomy, but regaining sovereignty over life.

The graph also explains why the exhibition is indeed in a privileged place for what I would call a *stereoscopy* of divisions and recursive opposites, in a manner that can come to terms with what Latour has analyzed as the paradoxical "seeing double" of modernity. The exhibition is capable of spatializing these divisions and turning them into topographies of "figures" and "ground." In the exhibition, the entire realm of figuration and the traffic between the relative poles of subject and object can come into view.

The Latourian graph hence gives a wider context to Clifford's system. It is important to note that Clifford is interested in the mechanisms of representation and the way that they are implicated in the making of the essential boundaries and systems of value-creation in a culture, and the dialectics as well as asymmetries of the self/other. And here, Latour has made a suggestion with far-reaching consequences, yet one I believe is flawed in parts and marks to some extent the limits of his system. This concerns the relation between the "internal" divide of humans and nonhumans that emerges from early modern thought and its relation with what he calls the "external" divide. Latour variously credits Descartes and Galileo Galilei or Thomas Hobbes and Robert Boyle as the origin of the "internal divide," (elsewhere he also suggests it might start with Platonism: there is no theory that can do without the colonization of origins, it seems, and Plato is always a welcome candidate). The internal divide separates humans and nonhumans, corresponding with the standard metaphysical setup of the mind/body dualism. For Latour, the "external divide" which separates European modernity from the primitive other, is the export of the first, internal divide. "In order to understand the Great Divide between Us and Them, we have to go back to that other Great Divide between humans and nonhumans."[11] The colonial frontier, Latour thus practically suggests, is the "export" of the paradoxical internal division: "they" are radically different (pre-modern) because unlike us, they do not separate between nature and culture. Indeed, "For Them, Nature and Society, signs and things, are virtually coextensive. For Us they should never be. Even though we might still recognize in our own societies some fuzzy areas in madness, children, animals, popular culture and women's bodies (Donna Haraway), we believe our duty is to extirpate ourselves from those horrible mixtures."[12] Henceforth, the distance between Europeans and the colonial other will be measured no longer in terms of religion (the right belief), but in the supposedly secular terms of the "modern" and the "primitive": the ability to distinguish between object and subject in certain and not other ways. Given the suggested symmetry of the two "Great Divides," people on the non-modern side would then be subjected to comparable protocols of objectification as a nature rendered objective in the laboratory, and the form of this protocol has been colonial subjugation, and the denial of status of full subjecthood, of being a legitimate subject of rights with a proper "voice." This is how Latour appears to "explain" colonialism, and it may sound convincingly at first. He takes no other origin of colonialism into account, whether from within or outside modern societies. Hence, decolonization, for him, is achieved once we impeach the Cartesian split. Race, gender,

class, and the boundary-making technologies of power that enthroned them, then also seem to disappear without residue. Indeed, for Latour, once the "first divide" is gone, the "second divide" must by necessity dissolve.

This is, in my eyes, the chief defect of Latour's system, which recently has led him to believe that he could simply pass, with his Actor-Network-Theory, from a "negative" modality to a positive ontology. The problem in Latour's heuristics is precisely that when they shift from being a heuristic operation and become an ontology, they slip into a homogenous immanence of a seemingly seamless terrain of mediation, lacking a sense for the fault lines of political struggle. That is true philosophically as well as politically, for what has disappeared for Latour once the "bifurcation of nature" is overcome, is also any point from which one could still meaningfully address actual exclusions and asymmetries of power. We are then to enter the "parliament of things", which Latour quickly asserts to us is not quite like the chatter of an animistic universe, or perhaps a film by Walt Disney. But what has practically disappeared is the sense that the networks are not homogenous, but internally and externally characterized by frontiers. What Latour once described as the asymmetry between "the complex" and "the complicated," namely the increasing inscription and enrolment of entities into networks and operational chains through making them calculable,[13] constitutes a useful line of argument by means of which one could recover, particularly in light of the rise of algorithmic governance, a critical sense of the frontiers of the present, and the perspective once represented by Max Weber and the like, but without their ignorance of science. The "middle kingdom," that vast expanse of what he calls "full-blown mediators," consists primarily for Latour of graphs and inscriptions. They seem to be at the eventful, and yet somehow obscure origin of the mutual constitution of subject and object. While in many of his works what he terms "to follow the actors" turns out to be a narrative strategy tracing shifting relations of the active and the passive, he curiously skips almost completely over the entire question of mimesis: the very terrain where historically, art (and later, the psychology of colonialism) has negotiated with the mediation and the murky vectors of the active and passive, of poeisis and pathos, but also of the dialectics of self and other, and of master and slave. But this terrain of enacted, bodily mimesis and psychological identifications disappears behind *scripture* in Latour's universe. Figurations that are not *written*, practically, have no place in the middle kingdom of Latour's design, and this overestimation of inscription is what makes him think he can simply move from a critique of modernity to a positive ontology of the network.

Hence, Latour's model tends towards a premature reconciliation, a false reunification across the Great Divides, declaring that we, too, have in reality never been modern, and that we have only now come to recognize this. This is perhaps poignantly expressed through the fantasy of a "second first contact,"[14] suggested by Latour in the immediate aftermath of the events of September 11, 2001; proposing that the former "moderns" and former "pre-moderns" start their politics anew on the grounds of a now revised, a-modern ontology. But who has ever witnessed such second first contact to take place? We can break through this impasse only by reversing the order between the "first" and the "second" divide. The "constitution" was the result of institutionalized practices that have their origin in the coming-into-being of capitalism in the early modern world. We can locate its origins in the early capitalist phase of "primitive accumulation" inside Europe, the witch hunts and the enclosures of common land. And we can trace how with European expansion, a simultaneous "cutting away" of the marginal bodies subjected to negative projections occurs. Then we realize that the "denial of recognition" of which Latour speaks with regards to the nonhuman has its origins in political reorganization and conquest at the dawn of capitalism, and that this "denial" had from the outset, at its extreme, a genocidal face; that in fact, the "Great Divide" that characterized modern European relations to the rest of the world, and the argumentation with regard to universality that informed the latest debates on human rights and the right of intervention, have their roots in early modern conflicts that reverberate to this day. An important dimension of this lineage is the medieval debate over whether non-European people had "dominion"—that is, property in their persons, goods and lands. In 1454, a papal bull declared that all non-Christian peoples had no ownership rights to the land on which they are living, and gave the King of Portugal the right to invade and conquer, convert forcibly and enslave, dispossess, expel, and ultimately, to kill those that failed to accept the truth, convert and be colonized.[15] This provided a long-lasting resource forging a consensus around the justification for colonialism. In *Two Treatises on Government*, the seventeenth-century British thinker John Locke argued that the use and exploitation of land is the criteria for rights to property, and since the natives did not exploit their surroundings as Europeans would, colonization was justified. The intimate relation between the modern self and its relation to property (previously called "dominion") certainly present a fertile line of inquiry that has not nearly been exhausted to the full, just as the inquiry into the exhibition as a "Third House" provides ground for a re-narrativization of art histories as part of the larger disciplinary and ontological partitions and their current unmaking.

Footnotes

1. Bruno Latour. *We Have Never Been Modern.* Cambridge, MA: Harvard University Press, 1993. Print.

2. James Clifford. *The Predicament of Culture: Twentieth Century Ethnography Literature and Art*. Cambridge, MA: Harvard University Press, 1988. 223-224. Print.

3. Bruno Latour. Op. cit. 82.

4. Ibid. 48.

5. Ibid. 37.

6. Ibid. 34.

7. Bruno Latour and Peter Weibel. *ICONOCLASH: Beyond the Image Wars in Science, Religion and Art.* ZKM; MIT Press, 2002. Print.

8. Thomas Keenan. "Photography and Counter-Forensics." *Grey Room* 55 (2014). Print. And *FORENSIS: The Architecture of Public Truth*. Eds. Eyal Weizman, et al. Berlin: Sternberg Press, 2014. Print.

9. See Georg Simmel. "Rodin." *Philosophische Kultur: Über das Abenteuer; die Geschlechter und die Krise der Moderne* (1911). Berlin: Wagenbach, 1983. 151-65. Print.

10. Fredric Jameson. *Late Marxism: Adorno, or the Persistence of the Dialectic.* New York: Verso, 1990. 232. Print.

11. Bruno Latour.*We Have Never Been Modern. Op. cit.* 97.

12. Ibid. 99-100.

13. "Complex relations force us to take into account simultaneously a large number of variables without being able to calculate their numbers exactly nor to record that count, nor, a fortiori, to define its variables. The lively and animated conversation we're attempting, leaning on a bar counter, is complex, as is the course of a ball and the play of football teams in a match, or the fine coordination through which an orchestra listens to or filters the emanation of each instrument and voice. By contrast, we'll call 'complicated' all those relations which, at any given point, consider only a very small number of varieties that can be listed and counted." Bruno Latour and Emilie Hermant. *Paris, Ville invisible*. Paris: La Découverte, 1998. Print.

14. Bruno Latour. *War of the Worlds: What about Peace?* Chicago: Prickly Paradigm Press, 2002. Print.

15. V. Y. Mudimbe. *The Idea of Africa*. London: James Currey, 1994. Print.

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Forging Rules: Glass Bead in Conversation with Keller Easterling and Benedict Singleton

Benedict Singleton,

Keller Easterling

It is common to consider architects and designers as opportunistic figures consorting with the industrial, financial and political powers in place. From this standpoint, their alliance to critical voices and to potentially emancipatory ends is often seen to be rather dubious. This critical characterisation has however been increasingly challenged by authors and practitioners who argue that playing with the rules of the game, manipulating things from within, diverting and subverting various power agendas, could be more productive critical strategies than direct opposition. Informed today by the debates emerging around accelerationism and theories of the common, critical strategies may come closer to the multiple meanings of forging. At once shaping a metal object by heating it and hammering it, constructing, by extension, something that is strong, enduring or simply successful, as well as falsifying, imitating, producing a copy of something in order to turn it into something else. Keller Easterling and Benedict Singleton joined us by email to discuss how their respective work related to such ideas and strategies.

Glass Bead: Keller, as an architect who is predominantly engaged in doing research and making exhibitions, you've argued, in your last two books, that architecture has more to learn than to teach about global politics and global urbanization. Benedict, you've engaged in a massive effort to philosophically reconceptualize what design is and can do,

yet you define yourself less as a theorist than as a strategist. Could you both tell us more about how this relation between the practical and theoretical dimensions of architecture and design unfolds in your respective practices?

Keller Easterling: I am sure I have said that, with regard to global politics, architecture has more to learn than to teach. And yet, so much of my work at present is about making palpable the spatial operating system of global development. I am trying to unfocus eyes to see not only buildings with shapes and outlines but also the matrix of activities and rules in which those buildings are suspended. This operating system is largely coded with econometrics by 28-year-old McKinsey consultants, World Bank yes men and commercial orgmen. Spatial expertise—spatial variables that embody intelligence, economy and social justice—is sorely lacking in global governance. Still, the most interesting thinkers in the social and political sciences are looking for a more complex context in which to test their master narratives and the authority of their supposed science. In a book published this year, *Extrastatecraft*, I am offering global infrastructure space as a valuable testbed for these inquiries.

While unfocusing eyes, I am also trying to change a habit of mind about form making and political activism. We are very good at "knowing that"—pointing to things and calling their name. In our most primitive moments we even regard this cumulative identification as a primary form of knowledge. But, with a tip of the hat to Gilbert Ryle, "knowing how" redoubles that knowledge. It is the ability to detect the unfolding interplay between things as an information system. We are accustomed to the abstractions of information systems—languages, DNA, or codes for digital devices. But we are less attuned to the ways in which information resides in the lumpy, heavy objects of our world—not only living beings but everything from the smallest object to buildings and cities. We are more aware of their name than the repertoire they enact. It is harder to see the ways in which objects are exchanging and generating information.

I am trying to demonstrate the ways in which the urban space of the city itself is an information system and a portfolio of values more tangible than the often risky abstractions of the global financial industry. Cities don't have to be coated with sensors to be complex networks and routers. Cities, the buildings and people in cities "compute." And urban relationships and practices constitute a set of assets.

Extrastatecraft rehearses the ability to read this matrix space as an infinitive rather than nominative expression. In addition to the object forms that designers are trained to make, the book considers the active forms that shape complex unfolding dispositions in the city. It's a longer discussion, but, in this extra dimension or part of speech, form can be indeterminate to be both more practical and more politically vigilant.

Watchdogs, Screenshot gameplay (Ubisoft, 2014)

Benedict Singleton: For my part, I'm a designer, by trade and inclination. I spend much of my time working "in industry," as we say–interaction design, service design, platform design. Design always has a certain theoretical component: ideas arise in the course of making something that can be redeployed, even if it's just in making the next thing. But these ideas are probably made a little more explicit in my area, as it's a terrain for design that is–relatively speaking–fairly new, and therefore underspecified. We are still trying to work out the basics of what it is we're doing. And this tendency to abstraction is reinforced further because my role, over the last ten or so years, has increasingly tended towards the strategic. I find myself more often with the job of working out what might be done, and how, than delivering a finished artifact.

So I have a professional interest in ideas that unlock new ways to proceed in a given situation: understanding how things *really* work in order to produce an effect; the relations–actual and possible–that design has with outside forces that set and are unset

by its agendas; and so on. Given their proximity to practice, I tend to value these ideas more for their efficacy than by their claims to being comprehensive; I'm more interested in diversifying possible courses of action than of creating a "theory of design."

Yet, certainly, themes coalesce. Perhaps the major one for me has been a view of design as something innately subversive: design is really what you do when you can't straightforwardly impress a pattern on the world, but must rather devise a sequence of oblique and well-timed actions in order to coax effects from unpromising materials–materials that are remote, volatile, stubborn, obscure, or otherwise resistant to manipulation. I would like to think that this has some valence outside design, too, not least because, of course, situations of this type are familiar from our daily lives. Perhaps design, as a field, can help us provide a language for–or maybe I should say, *a geometry of*–such scenarios, a task with which the official canon of Western thought has not, it appears, been much concerned.

Over the past few years, a more significant fraction of my time has become dedicated to exploring these ideas *in themselves*, taking tools I use in my broader work–design, but also writing and latterly film–into spaces better suited to expeditions of this sort. Fiction, the gallery, *et cetera*. I like the idea of making art in which people whose lives are spent getting things done, be they tradespeople, board directors, busy single mothers, whoever, can see recognized and reflected the intelligence at work in what they do.

GB: It appears quite evident in what you are saying that, in order to rethink architecture and design, in order to expand their understanding beyond buildings and beyond what can be called a "solving problems" logic, it is necessary to rethink the type of spatiality in which they intervene, and the spatial logics in which they can engage. By focusing on Castalia, we similarly wanted to emphasize, in this issue, the spatial and institutional dimensions of The Glass Bead Game. Once we understand Castalia as the site where the game is played, it becomes possible to underline that the limits of the logic of the game are also related to problems and limitations that are associated with both the modern (i.e., extraterritoriality) and the postmodern (i.e., localism, particularism) understandings of the concept of site. Both of your projects deal quite extensively with this concept, or at least with related questions and problems. Could you explain how your respective projects relate to such a critical and speculative engagement with the notion of site, and how do you see the specific role that architecture and design can play in moving away from the endless dialectical play between extraterritoriality and localism?

BS: If you trace the conceptual history of 'plot', you find that before around 1500, the term refers solely to a marked-out site, an area of land. Over the next century or so, the term's meanings proliferate to the point where their connections are no longer immediately obvious: drawings, narratives, and seditious plans are all called plots. The underlying logic that guided this development illuminates an alternative conception of design in a very striking way.

Plot's initial, *spatial* meaning, the demarcation of an area, transferred into the language of the workshop. One plots out a design on paper before acting on other, more expensive materials. So a *constructive* sense of plot arises, relating to diagrams, maps and charts. And within a few decades, this graphical 'plotting' was adopted into the lexicon of the early modern theater, where its artisanal meaning deepened into a *narrative* sense: plotting as the arrangement of people and things over time, so as to tell a story.

Up to this point, 'plot' shares a substantial similarity to 'plan'. Both words couple the idea of a spatial arrangement with a schedule of unfolding action. Plot's connection to territory (and the politics of its division), cartography, and stories make it, perhaps, the richer word. But most interesting is that, on the back of its theatrical use, plot acquired a further, specifically *subversive*, sense, which planning does not possess: plotting as the subtle orchestrations of an unseen director, manipulating the course of events from behind the scenes.

So 'plot' encodes a particular form of creativity, too, which can be glossed as the production of a *plot twist*. This is the point at which one plot is subverted by another one, just as the routines of the bank, the placement of cameras, the structure of the vault and the peccadilloes of the manager become the raw material of the heist. Put another way, plotting is always *re*-plotting: discerning the contours of an unfolding situation and locating the opportunities it presents for 'leverage'–points in space and time at which an action can generate an effect disproportionate to the physical effort put into it. A plot, we might say, is a plan invested with this kind of underdog intelligence.

In a kind of closing of the circle, 'site' (the original meaning of plot) remains critical to this idea of the creative twist or what we might call *the kick*–the moment where one plot is derailed by another. Rather than conjuring an image of how the world should be and then trying to force it into being, plotting takes a site's particular structure, its fixity or at least predictability, as the platform for new and potentially unlicensed operations. Recovering the full sense of plotting, as an intervention that starts from a point of

comparative weakness and proceeds through guile and ingenuity, forges a deep conceptual link between the creation of artifacts and political intrigues, dissident stratagems, and other ruses.

KE: I am not just being churlish when I say that, if asked whether I was more nourished by Herman Hesse or an especially gifted confidence man, I would have to go with the latter. As is probably clear from both *Enduring Innocence* and *Extrastatecraft,* like Erving Goffman, I learn from discrepant characters—pirates, swindlers and others who have mastered the art of decoupling what they are saying from what they are doing. (There are sympathies with Benedict here surely, and discussions of "The Long Con," the title of one his essays, even appears in my writing as well.) Perhaps the only thing of note that I bring to the study of space is a training in theater where this decoupling is routine—as is the understanding that actions are primary carriers of information. (The line is "Come home, son," but the consequential information is carried in the action played—to reject, to grovel or to smother.) It is this perhaps deceptively simple skill that is useful for designers in a world of stealthy politics.

For both designers and activists, the forthright, the direct, the sincere is often valued over the discrepant and the sly. But learning from Rosalind Williams and others, the formulas and spatial products of infrastructure space are nowhere in particular. Infrastructure space is a distributed condition organized by mixtures of state and non-state players. Some years ago, I designed "site plans" for spatial products that were something like a slide rule with the north arrow spinning. There is no place and there is no guarantee that the righteous duel of the activist or the directness of the designer address will register change.

These are networks of spaces where remote controls, switches and multipliers are better as active forms. As Gregory Bateson said, "A switch is a thing that is not." Active forms are not finished but dispositional and unfolding in time. There is no object or master plan but something more like the identification of linkages and interdependencies that remain in place to counterbalance each other. Maybe then, there is a chance of pacing with the shifting disguises and turnabouts that every sneaky player in the world tries to get away with—design as a snaking chain of moves that can gradually get leverage in difficult political situations. That is what I meant by referring to the indeterminate as both more practical and more politically vigilant.

Chic Point: Fashion for Israeli Checkpoints. (Sharif Waked, 2003)

GB: You both talk about figures and strategies that seem to have a lot to do with the notion of game: the especially gifted confidence man, the pirate, as well as dissident stratagems, and other ingenuous ruses… But how do you see in relation to ethical questions? It seems that, in order to avoid some kind of cynical free play so commonly praised nowadays, we need to be able to draw a line between mastering the game and being able to transform its rules…

KE: "Mastering the game" in this context sounds a bit like "working from within"—the idea that one plays along on the inside of an organization in order to figure out how to eventually manipulate it. I don't see the techniques that Ben and I explore as necessarily conducted "from within." Maybe there is no possibility of working "from the outside," but I still labor under the assumption that one can manipulate without collusion. Ethics travels along a Möbius strip of meanings sometimes on opposite sides of the same surface and approaching from different directions. For some, it describes the maintenance of consensus around stated principles. I am temperamentally uncomfortable with this hope for a steady-state and better disposed to ethics as the

maintenance of dissensus around a necessarily indeterminate struggle with circumstance and evidence. One notion of ethics operates in a declarative register and the other in an active register. Maybe the word indeterminate is a stumbling block because it signals to some equivocation, lack of conviction or the "cynical free play" to which you refer in your question. Here is a quote from *Extrastatecraft:*

> *…Any deviation from the proper techniques, even in an attempt to aid and broaden activism, may be interpreted as a betrayal of ethical principles. Manipulating the market is mistaken for collusion. Giving positive attention to agents of systemic change rather than negative opposition to a series of enemies is mistaken for an uncritical stance. Relinquishing the grip of resistance is mistaken for capitulation or ethical relativism. Answering duplicity with duplicity is mistaken for equivocation or lack of conviction rather than a technique to avoid disclosing a deliberate strategy.*[1]

But, for me, indeterminate only refers to situations that are dispositional or time-released. Also the most powerful players in the world rely on indeterminacy, so that, in the winding road of political manipulation, they can be Goliath one day and David the next. The notion that there is an ethical consensus and proper realm of political negotiation plays into the hands of this elusive behavior. It is easy to trick dissent if declaration is the only thing that counts and information. And squaring off against these powers often means that you are either escalating the tensions or violence that you want to diminish or shaking your fist at a ghost. To acknowledge an indeterminate and changing set of techniques is to stay light on your feet and exercise the same political agility that the most powerful characters enjoy. You can never congratulate yourself for being finished. You can only start a ratcheting interplay that gains advantage over the abuses of concentrations of power.

BS: If it's a type of game we're talking about–and it's an odd type of game indeed when one competes for the right to set the rules–it's premised on seduction. We're all familiar with the tale of the detective who goes too far. They pursue the criminal, trying to piece together fragments of evidence into a trajectory, so that they can intercept their prey–supposedly to enact justice, and restore order. But of course they target the criminal just as the criminal entrapped *their* victim, and in the classic cat-and-mouse set up, the criminal must think like the detective, the detective like the criminal… Their identities first synchronize and then converge as the situation escalates. From what we might call *a plot's-eye view*, these apparent adversaries are complicit in the propagation of the plot itself, which grows in sophistication with every twist. Noir, especially, is sensitive to this crossing of lines: the corrupt cop, the principled thief.

There is sometimes a blackly comic aspect to being drawn into the whirlpool in this way. In the UK, as I write this, a highly professionalized system of public politics–very slick, very cruel–is trying to reckon with the advent of Jeremy Corbyn: a figure by all accounts as straightforward, unrefined, and honest as they come. Neither his fellow politicians nor the media seem to know what to do; to their evident rage, every attack they launch seems only to bolster his popularity. Is this the start of a new game, or simply a knight's move in the old one? As ever, we will have to see. But it provides a topical example of how becoming attuned to the rules of a very complex game indeed, becoming a player of great skill, can *itself* be a set of blinkers, and, under the right circumstances, a terminal flaw. I'm very interested in how we might train ourselves to understand these *actual operations of the political* in a different light: a politics of the gyre, as it were. As Keller suggests, apparent errors in the established script can function as footholds for other forms of action. When we see our ideals flounder in practice, there's a temptation to fall back on simply affirming them anew; maybe if we refine the way we phrase them just one more time, we'll have found the correct combination for the safe that's rumored to contain a better world. Clearly that doesn't often work, and other approaches are necessary. But a more subtle temptation is to see the exploitation of these apparent discrepancies simply as opportunities to bring down The System, which can then be forgotten once we've replaced it with The Better System. As noble as the envisioned substitute might seem, it, too, will come with its side-effects, backfires, and off-label uses… We need a *gyropolitics* capable of reckoning fully with these complex reversals, escalators and complicities.

GB: Keller, although you focus on global infrastructure space and on depicting the operational formulas that shape global urbanization, you also often talk about cities. Here you even say that, once considered as an information system and a portfolio of values, the city remains a more tangible site than the abstractions of the global financial industry. Benedict, the schematic history of the notion of plot that you propose could be read in parallel to that of the city. Largely drawing on the ideas developed by Henri Lefebvre in *The Urban Revolution* ([1970] 2003), several authors are arguing today that cities have been completely absorbed by at once more continuous and more heterogeneous forms of urbanization. It seems clear that cities are no longer the bound topographical entities that they once were, surrounded by walls or delimited by clear administrative and morphological boundaries. However, this does not necessarily mean that they are not topological singularities that must be reckoned with. Do you think

cities are still strategic places architecture and design should engage with? Or do you consider that we are past that? And that the city has been diluted in global processes that unfold at different levels?

KE: I used the word "city" to describe urbanity as it assumes various forms and intensities. Because I am looking at space itself as an information system, I am trying to assess when urban dispositions are information rich or information poor. Those urban dispositions might be at the scale of a huge conurbation, a rural village or a distended suburb. Beyond access to digital information systems, I am working on access to information-rich spatial technologies. Urbanity is perhaps also for me, the condition capable of introducing errors into any organization or formation—error and contradictory information that continues to grow information in ways that are irreducible.

BS: Keller's talk of McKinsey consultants and World Bank orgmen as vectors of contemporary urban forms makes me think of the city as a zone of *deals*. Discussed in the terms of the economic theories favored by such agents, the deal is framed as a matter of mutual benefit, self-interest, fair exchange; but it appears quite differently when refracted through the kinds of ideas I've previously outlined.

I'm reminded of the strikingly original way that the anthropologist Mary Helms, whose work has been an abiding influence on my own, describes a level at which design and trade become equivalent. Rather than assuming the former simply provides the material for the latter, the two practices become comparable when they're seen as acts of negotiating an ambiguous environment, one traversed by complex and partially concealed forces, in order to procure an object. Put very simply, the intelligence with which the artisan approaches their materials is mirrored in the art of dealing with strangers in the marketplace. In this link we can observe how design grades into the soft power of branding and diplomacy, but we can pursue the connection further with regard to the deal, I think.

The deal is a commitment or pledge to which you will be held by exterior forces, in this case at least one other person. The agreement that finds expression in a deal, whether it is as a signatory on paper or registered in a shared glance (neither is necessarily the more binding), is an explicit alignment of multiple agendas. This fixes a degree of predictability in the articulated relationship—an alliance, however brief, which in turn can be built on by all concerned. But the full range of this pact's ramifications is not given in advance, and the real terms of a deal might only become visible later, as its ultimate implications

begin to surface–perhaps in ways to be celebrated, perhaps not. I'm fond of the way a deal's basic structure, and the dawning awareness of its delayed implications, are both compacted into the phrase *shaking hands*.

Cities are the psychological epicenter of this procedure, the place where deals proliferate and stakes become extravagant. They are accordingly rich with typologies of ascent and shipwreck, trouble and oasis. This quality seems inherent to the city. Its enduring richness as a model of the maximally artificial environment, compared to say the submarine or spaceship, is not just a function of its scale and heterogeneity. These latter qualities are themselves a function of the city's generative paradox: a bounded space, but open to the outside; a stable zone, but predicated on arrivals and departures. Such an environment is configured to continually test expectations. Think of the marketplace, where deals are done with figures from afar, whose motives may be as dubious as their standards are unfamiliar, and are prone to disappear when called upon to uphold their side of the bargain. Indeed, Helms writes of the historical and geographical frequency with which this quality of urban marketplaces has been extrapolated into rumors that they are *haunted*, comprising a gateway to the unfamiliar Outside–where nothing can be relied upon to be as it seems––situated at the heart of a settlement. Although stated in very different––and far more abstract–terms, I suspect the reconceptualization of the market by the philosopher of finance Elie Ayache runs along compatible lines: the market not primarily as a zone of exchange, but the mechanism that resets our models of the world. "The medium of contingency," as he calls this proving-ground. The city as the substrate and product of this medium has yet to be explored.

Still and Unedited production screencap from The Last Girl Scout, 3 min (Benedict Singleton & Brian Rogers, 2015)

GB: We would like to end this interview by moving from the city to outer space exploration. Space traveling design seems stuck in a contradictory movement: while it aims to conceive of ways to displace life in radically foreign contexts, this move tends to preserve the exact same conditions of life as those we know on Earth. In this context, outer space exploration seems caught in a logic of colonization: a logic of spatial expansion that relies on the preservation of the same. Here an obvious image comes to mind: the end sequence of the recent movie *Interstellar* and its outer space replica of the American Midwest.

Just as the growth of the city triggers discontinuous scaling phenomena which irreversibly transform its identity, truly leaving the earth would imply, in the long run, exposure to conditions which would inevitably de-nature what we are.

How can your respective conceptions of design help us in thinking of such a form of

deracination? In other words, to what extent can an engagement with such contingencies really break with the logic of continuity that you describe? Or, can we think of and construct new articulations between contingencies and continuities?

KE: I am a very poor interlocutor for questions like this. I recognize that I must be one of the few human or non-human beings who are bored with science fiction about manned space travel (as opposed to space exploration). Maybe it is because the stories often have conservative templates or formulas into which supposedly fantastic and sensational material is poured. Your question may even reflect this. Maybe it is the predictably anomic anti-heroes who are a bit of a turnoff. Maybe the whole atmosphere of newness also seems to align with or reinforce our larger cultural mistakes about the advent of new technologies—anticipation of either the dystopian crisis or the redemptive universal platform for exchange. Are these the melodramas of the teenaged or the middle-aged? I am not sure. But I have the sense that they predetermine expectations about a human mind in interplay with conditions like space travel. While I know very well that sci-fi imaginaries can be nourishing, I stubbornly find dyspeptic some affect surrounding the form. It reminds me of a toupee.

BS: A toupee—what a delightful image! And apt. I share Keller's distaste for these acts of gussying-up, in which outer space becomes the glittering backdrop for narratives that wouldn't be out of place in 19th century fiction. Of course, science fiction is a sophisticated field, and exceptions are, mercifully, easy to find. But the general tendency remains common, and colors, too—the reception of real-world initiatives.

I've written elsewhere of ditching this intrepid naval heroism in favor of something more interesting. Space exploration renders in hyperbolic form a circuit of frontier exploration, technological invention, and the stretching of intelligence in the face of the new–a loop present in other narratives concerned with the breach of apparently insurmountable obstacles, in defiance of a received view of the odds: the prison break, the heist, the con job, and so on. Maybe more of conceptual sustenance can be recovered from investigating this connection than yet another clumsily retrofit of advanced tech onto the frame of a *Boy's Own* adventure.

My most recent self-directed work has followed this hunch, especially in a collection of stories called *Character Set*, serialized in the magazine *After Us*. *CS* is an experiment in actively developing popular cultural archetypes fit for the 21st century: a kind of "platform fiction"—the production of a sourcebook or manual that gives more distinct form to figures around us which are, as yet, only dimly sketched.

The first few stories develop a concept that initially emerged in a film piece I directed with the artist Brian Rogers for the Tate earlier this year. We wanted to make a cinematic portrait of a *final girl* figure (sole survivor of so many B-movies) focused on how she so often fashions her escape by building an improvised machine, a trope that gives the piece its title, *The Last Girl Scout*. We were interested in how she represents a kind of alternative origin story of technology: the figure engaged in the million moments of invention that are elided at the start of *2001* in the famous smash-cut from club-wielding protohuman to spaceship.

The first *CS* story developed this figure further; the second explicitly takes up Kubrick and Clarke's enigmatic monolith, rewriting it as a fugitive, mobile and distributed structure, bootstrapping itself into existence. Its contours only ever glimpsed in certain kinds of thought, talk and action, *this* monolith is ultimately pitched as a speculative megastructure that comprises every crime ever committed. The common element in every transgression of the status quo, it constitutes a kind of network of secret passageways through time: as such, any scenario that witnesses a visitation by the monolith is rendered at once incredibly ancient and entirely futuristic. The third story will be about "the straw astronaut," extending this line of thinking into the question of "what is the thing in the spacesuit." Its protagonist is a scientist commissioning the heist of a disputed archaeological find, believed to be the bones of the first tool-using hominids, from a bank vault (making the story a kind of cross between *Quatermass and the Pit* and *Heat*); in the process, he has cause to reflect on how millions of years of just this kind of guileful operation have transformed our anatomy and cognition–because insofar as we are redesigning things around us, they are also, subtly but on an accelerating timetable, redesigning us.

Interview conducted for Glass Bead by Fabien Giraud and Jeremy Lecomte.

Footnotes

1. Keller Easterling. *Extrastatecraft,* New York, Verso, 2014. Print.

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The Consequences of Philosophy

Giuseppe Longo

> *"In the transition from consciousness to reality, the ego, the thou and the world arise into existence indissolubly connected and, as it were, at a stroke."*[1]

The Line without Thickness and Money

The "Big Bang" of Western mathematics dates from Euclid's definition β: a line is a length without thickness. This invention connects mathematics with Myth while proposing new forms of knowledge, and it organizes human space by separating the visible from the invisible, extracting Platonic Ideas from the world. In his *Confessions*, Saint Augustine recalls that even the filament of a spider's web has thickness; so it is impossible to draw this idea of a line from sensory experience—God enables us to know this mathematical structure by inscribing it in our memory. Yet without adopting a hypothesis pertaining to absolutes, we may reconstruct the entirely human symbolic gesture that inaugurates the invention of the line without thickness. The latter is merely a boundary cutting out the figures of Greek geometrical lines, pushing to the limit the feature by which our ancestors in Lascaux drew bison composed solely of lines and contours, in which only humans can see the silhouette of an animal.

Ancien Greek Coin, Phocaea, 5th Century BC. Photo Credit: Doug Smith

Philosophy, mathematics, and metal currency were born almost simultaneously in Ionia between the seventh and sixth centuries BCE.[2] These three practices each bear new forms of thought and social life. The invention of money implies categorization—a generalized equivalence, Marx and Keynes would say—which is linked to what philosophy does. As regards mathematics, the Euclidian axiomatic demonstration—this product of the *agora*—is as important as the invention of purely ideal structures, such as the line and the point, which organize and measure the world, while existing solely in language and in the *gesture.* Ideas are grasped through gestural practices, trajectories in space that show (*montrer)* the *demonstration* through movements of traced points and lines. The theorem comes from *theorein,* a "seeing" that refers to "showing", on the model of the *theater,* where we access to "ideas" through the viewing of mythic events.
Among these mathematical "ideas," the line as the trace of a continuous gesture is a fundamental notion: the point (*semeion*) is at the extremity of a segment (definition γ) and is apprehended, according to Euclid (Theorem 1, Book I) as the sign of a position on a

line or an intersection of two lines. The point is not the fundamental entity: from a spatial-geometrical point of view, it is not the line that is composed of points, but it is the point that is the sign-trace of relations and movements of which the line is the support. All the figures of Greek geometry are composed of continuous lines and their intersections. On the one hand, figures constituted of lines without thickness make it possible to calculate surfaces; on the other hand, the ideality of the line, a limit notion, explains the eruption of the irrational (*alogos*) into the calculation of finite figures. The geometry of "pure" lines exceeds the arithmetic *logos* and organizes the world through relations of reciprocal determination between abstract diagrams rooted in humanity's gestural and figural experiences—experiences to which the bison of Lascaux are a testament. Coin currency also institutes abstract relations of equivalence between objects that are fixed in symbolic writing (the value of the first coins was marked by geometric figures and by their combinations). This relation between geometry and ideality—between abstraction and figural vision—also governs Greek philosophy, the fundamental notion of which is the *eidos*, the Idea.

Uniform Rectilinear Movement

Thanks to a gesture just as audacious as Euclid's, Galileo introduced into physics the principle of inertia as the fundamental principle of conservation (the quantity of movement). Galileo's principle constituted a shift to the limit: since perfect inertia does not exist in the world but rather is an external limit, then Galileo, ideally situated on the horizon of all movements, can make them all intelligible as modifications of an ideal limit-state. In the Italian Renaissance, the infinite-ideal encounters the finite—i.e., human—world and natural processes. This revolutionary encounter became a prime theme in the great medieval theological debates,[3] but its spatial representation would arise in the pictorial theology of the *Annunciations*—the decisive site of the invention of linear perspective.[4] At the start of the fifteenth century, the presence of divine infinity within the finitude of a woman—the Virgin—is symbolized by the inscription within the painting of a perspective point where the lines converge "on infinity." Later, Nicolas de Cues and Giordano Bruno plunged humanity into a God-Nature infinity that expressed a new view of the human condition: a gaze from infinity that reconciles humanity and divinity, ideality and spatiality—just like the *Annunciations* articulate the infinitude of God with the corporality of the human creature.

Piero della Francesca, The Annunciation to Mary, c. 1455, fresco, 329 x 193 cm, San Francesco, Arezzo

Renascent pictorial art is the prime site that plunges figures into a spatial-geometric infinity: according to Pomponius Gauricus, the artist should draw space on the canvas before situating the bodies there.[5] Piero della Francesca is faithful to this principle, whereas with Paolo Uccello and Ambrogio Lorenzetti the geometry of pictorial space follows upon the event depicted. But in both cases, it is geometry that organizes the event, by giving it a visible and signifying structure. Shortly thereafter, mathematics and physics (with Descartes, Desargues, Leibniz, and Newton) embarked on an analogous journey, rendering intelligible the forms and movements of *finite* material bodies through *infinite* principles-limits.

The Invention of Mathematical Space

If the geometrical organization of pictorial space becomes inseparable from the constitution of figures and events, the geometric organization of space in physics becomes inseparable from the constitution of trajectories, which the Aristotelian vision studied as if they were independent and isolated phenomena. From Descartes to Newton, the space preexisting trajectories is constituted as an a priori structure, which Kant would turn into a principle—no longer of the real, but of knowledge. But this preexisting structure of cognition has generally been considered as an ontological reality. Thus there developed an implicit Platonism that turns equations, functions, forms of writing and of being, into ideal things that precede the world—a spontaneous ideology that is found in biology in the metaphor of DNA as a "code" preceding and containing the organism, just as God (or evolution) "programmed" it. The birth of ontology implicit to the Renaissance is also over-determined by the invention of paper money, which is a subsequent phase in the process of abstraction of value and of social relations.[6]
The complex articulations between myth, theology, and the formation of scientific thinking constitute the object of historical epistemology. However, the various "spontaneous" Platonisms that continue to exist in the philosophy of mathematics refuse this "gap," this distanciation, that enables epistemological reflection: they reify the constituent human gestures, theological and mathematical, by which the world is rendered intelligible. In reality, the line without thickness, the point-sign, linear perspective, and space given a priori are all merely non-arbitrary constructions, engendered by concrete practices rubbing up against a "real," which by its constraints channels our knowledge operations. But these constructions whose dominant traits are immateriality and mathematic invariance—and whose power arises from not only their great efficacy in mathematics and physics, but also from their mythical and theological origins—are completely inadequate for the biological field. It is this inadequacy that links the epistemological problem to the current orientation of our work.

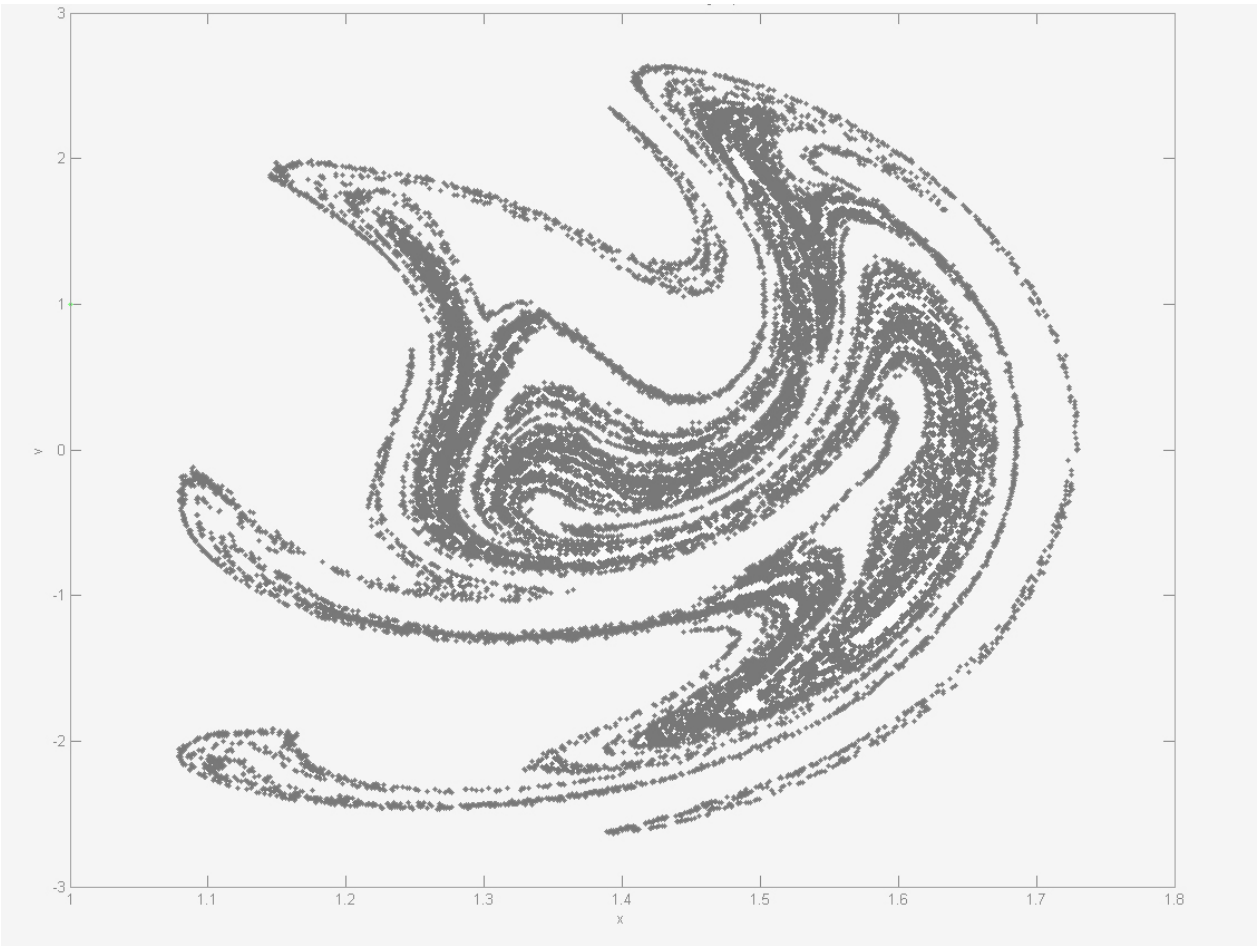
Intermezzo: *Existence and Truth*

Any discourse on the "existence" of a mathematical structure (like the line without thickness) misses the problematic of the constitutive gesture. Not only does study of the brain show that the latter imposes boundaries on objects,[7] but the organization of the world into continuous lines also arises from the organism's primary gestures, starting with the circle of retention-protention.[8] But these biological structures do *not* already

contain the concepts of line and border: they are merely the *conditions of possibility* of a primary relation to the world that language, drawing, and writing organize conceptually on the basis of the gesture of drawing figures on a rock.
It is impossible to subject the principle of inertia to empirical verification, which would require realizing in the world an absolute absence of forces. We are dealing with organizing principles that arise from a praxis that allows us to regard the world from a shift to the limit. The mathematical structures issuing from a long scientific and theological history may nevertheless be modified through confrontation with the constraints of the real: this is the case with Relativity, where the Riemannian form of space, unifying inertia and gravitation, is ultimately the fruit of a reorganization imposed by the observed invariance of the speed of light. The power of symbolic constructions[9] as well as shifts to the limit allow us to apprehend the finite from the *a-logos,* and the *a-peiron* continues to support the construction of our knowledge of the physical world. However, the question arises of whether these principles enable us to grasp the historicity and variability of what is living.

Space and Laws

It was only in the eighteenth century that the term "law" came to predominate in the vocabulary of the sciences—a projection onto nature of divine law, and according to some, of the law emanating from absolute monarchies.[10] There is a link between the takeoff of a notion of law in the natural sciences and the invention of space. The idea of physical laws does not become a rigorous notion until it is formulated in the form of equations, which is only possible thanks to the construction of the a priori structures that are space and time, conditions of the possibility of physical and mathematical knowledge. For the regularities of nature to become "laws," they have to be written in the form of equations or as functions of evolution, and to do this, it is necessary to construct an a priori space of mathematical inscription (spatiotemporal parameters). Mathematical physics in the nineteenth century would extend the Cartesian space of Newton, Lagrange, and Laplace into the space of phases, i.e., a framework given in advance as a condition of possibility of the determination by equations of geodesics—that is to say, optimal trajectories into the considered space. This framework remains an a priori condition even when the determination of trajectories proves incomplete, and when the formalism of equations describing the trajectories leads to the unpredictability of a determinist type, as in Poincaré's resolution of the three-body problem, which destroyed Laplace's myth of complete determination.[11]



Poincare plot of Chaotic Pendulum Activity (Single Phase)

In the nineteenth century, positivism repressed the theological and metaphysical origin of the "laws of nature" and attributed to them the power to totally regulate human actions. From these illusory postulates derived the catastrophic failure of the theories of economic equilibrium, which Poincaré had already demolished in a letter to Léon Walras. But the idea still persists today that economic processes correspond to a Walrassian dynamic, which spontaneously engenders an optimal state when it is not disturbed by exterior interventions. Here we are dealing with a metaphysics of power that considers society as an ensemble of rational individuals who are each aiming at the maximization of profit, and whose interactions produce a spontaneous social order, regardless of communication among people and their capacity to construct a common world. This metaphysics implies the idea that people can and should be governed by the laws of numbers, the techniques of calculation, and the norms spontaneously engendered by the statistical treatment of data. This principle is affirmed in a universal normalization of any policy—economic, political, and scientific—by its statistical results, which end up rendering superfluous and negligible both the singular variation and the

qualitative decision. The normativity of statistical data completely forgets that the decisive moments in the history of scientific thought have involved radical metaphysical decisions and a new articulation between the regularities of the real, on the one hand, and mathematical ideality on the other. The decision to organize space on the basis of lines without thickness, to look at the system of celestial bodies from the sun's point of view, to imagine spaces whose curvature is variable, the continuous deformations of space-time, and finally the articulation between number and form (*Gestalt*) under the various forms of analytic geometry, differential geometry, and algebraic geometry as far as Grothendieck topoi—all these decisions are founded on explicit metaphysical "leaps." What negates an economics founded on numbers are the choices bearing values that correspond, in mathematical physics, to the introduction of new structures and appropriate observables, such as the quantity of movement, energy or entropy, fluidity, or the "color" of quanta.

A Theology Overthrown

It is in biology that the myth of computable, alphanumerical data has produced the greatest distortions throughout the twentieth century, by making DNA a "program" separate from cellular materiality and by reducing organisms to simple "avatars" of genetic information. While biologists like François Jacob[12] directly identified genes with alphabetic writing, Francis Collins, director of the National Human Genome Institute publicly asserted in 2000, "*We have grasped the traces of our own instruction manual, previously known to God alone.*" This myth fabricates universals from particulars, by overthrowing the infinite-finite relation that had propelled the takeoff of science from Antiquity to the Renaissance. The finite technical activity of the computer programmer, the heir of the artisan-clockmaker, is projected onto the action of God or evolution. Moreover, a person reduced to a codifiable sequence of *bits* loses the material thickness that Renaissance painting had conferred on human figures when plunged into the tridimensional infinitude of the Universe. The relation between the finite human and the mathematical infinite is broken down by digital and alphabetic metaphors, which erect into mythological entities the images drawn from common sense–with which science is supposed to break. These images effect "transfers" of vague, "weak" meanings,[13] whose crude dualism effaces the singularity and historicity of the living, which is always *this living thing here*, with *this* body and *this* history, irreducible to the ideal invariance of mathematics, to the a-historic generic nature of its objects—or at least not in the same terms as in physics.

Strong Consequences of Weak Hypotheses

The image of the DNA-program has had several consequences: first of all, the idea that biology, dependent on the properties of molecules, could be reducible to the laws of physics.[14] But which laws? Mathematical physics, from Galileo to quantum, has never ceased constructing and modifying its laws by confronting unprecedented phenomena. What I am trying to do in my work, along with Bailly and Montévil, is to articulate certain physical and mathematical theories with phenomena that are specific to life. In science, unification should always be provisional and "local," not dogmatic and reductionist. But there are other consequences of the weak hypothesis when it is transferred from common sense to biology, whose effects on analyses of cancer interest me most at present. This domain was long dominated by the ideology of the computer program, in which cancer was supposedly the result of DNA deprogramming provoked by a signal that disrupted the instructions given to cells.[15]

From Triumph to Debacle

Since 1971, enormously funded projects have heralded the final victory against cancer thanks to genetic therapies able to "reprogram" "deprogrammed DNA."[16] These therapies were supposed to be based on the "rock" of chemical and physical laws, and the proximity of metaphors of "programming" to common sense facilitated their success among funding bodies and civil authorities as well as in public opinion. However, a half-century of genetic research has produced no genetic cancer therapy whatsoever, or even any solid knowledge about the unleashing and developing of cancer.[17] On the contrary, the huge effort to decode the DNA of cancerous cells (undertaken starting in 2000) has demonstrated that the complex nature of cancer cannot be reduced to any purely molecular cause. The enormous financial efforts and the harsh repression of alternative hypotheses have both been motivated for long decades by the idea that any phenotype presupposes complete determination by the genes. By contrast, approaches such as that proposed by cancer biologists Sonnenschein and Soto,[18] and adopted by Longo et al.[19] are based on the Darwinian principle that organisms, including cells, tend to reproduce themselves with variations (a limit-state analogous to Galilean inertia, but specific to life forms). Lacking effective control by tissues, hormones, etc., the reproducing cells may reach the speed of embryogenesis, which is the case with certain tumors. Thus cancer does not depend on a "triggering signal" at the molecular level, but on the failure of the regulatory relation between tissue, organism, and ecosystem. These

hypotheses, and their therapeutic consequences—which redirect the attention of researchers to prevention and environmental conditions—have only just begun to spread into the field, after decades of the informational-programming catastrophe.

Working Hypotheses in Biology

And so it is appropriate to go back to Darwin, whose greatness is to have formulated the theoretical principles of intelligibility of the biological, on the model of the great creators in mathematical physics. The two Darwinian principles are descendance with modifications and selection. The challenge is to articulate these principles with the analysis of the organism, unifying ontogenesis and phylogenesis. We have already looked at the role of principles in mathematics and physics, from the geometric structures of the space to the principles of conservation. The quest for principles in biology should follow these examples, but the principles specific to physics—founded on invariance, conservation of properties such as symmetry, and optimal trajectories—are inadequate for the reality of living beings. Living systems are in a constant state of critical transition: their symmetries are continually breaking up and being reconstituted.[20] Thus the Darwinian principle of reproduction-with-variation may be seen as a principle of *non-conservation*, opposed to and symmetric with the principles of conservation and invariance in mathematics and physics. The adequate theorization of the biological field therefore demands extensions and intersecting of various physical theories—demands that we think of the coexistence of random classical and quantum phenomena in the cell.[21] These operations rely on existing physical theories, while remaining irreducible to their techniques; they are "points of view," "perspectives" on the organism, whose unitary and primordial reality furnishes the guiding thread through these different theorizations. The intelligibility of the biological field is only possible through intersections and partial integrations that aim to construct objects-of-knowledge in dialectical relation with the constraints of "raw" experience. In biology, this experience plays a singular role, unknown to physical theories: thanks to mathematization, the latter cut generic objects out of the real, and their objectivity depends entirely on the theoretical framework.
In biology, on the other hand, objects are always historic singularities, which are grasped by conceptual models that are qualitative, provisional, and over-determined by culture and ideologies.[22] The centrality of each singular organism, with its own historicity, implies the primacy of variation and the breaking of symmetries that overthrow the mathematical primacy of invariance—a primacy with very powerful knowledge effects, but which proves an obstacle to understanding life, especially when it is disfigured in the

image of DNA as the informational invariant and the myth of the "program." For example, the materiality of each organism, its historical thickness, and the density of its internal and external relations, rule out any dualism between "software" and "hardware" that is specific to the notion of computer programs. Finally, one of the decisive operators of objectivity in physics is overthrown in biology: the space of phases (the observables and the parameters). Whereas space was fixed a priori as the condition of possibility and immanent norm of physical trajectories, in biological processes, by contrast, the singular trajectories constitute and constantly reorganize the space of possibles (of phases), the ecosystem, and the observables are the *results* of processes.

If our analysis of living dynamics is pertinent, it poses the problem of how to test the limits of traditional scientific objectivities, of which physics and mathematics represent the paradigms, in the face of the constraints of biological theorization. Overcoming very powerful theoretical practices that are rooted in venerable metaphysical and theological ideas is a radical challenge, but attempts are finally seeing the light of day.

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Footnotes

1. Hermann Weyl. *The Open World. Three Lectures on the Metaphysical Implications of Science*. Yale University Press, 1932. Print.

2. Clarisse Herrenschmidt. *Les trois écritures*. Paris: Gallimard, 2007. Print.

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4. See Daniel Arasse. *L'Annonciation Italienne. Une Histoire de Perspective*. Paris: Hazan, 1999. Print. And Giuseppe Longo. "Interfaces de l'incomplètude." English and French versions at <http://www.di.ens.fr/users/longo>. Web. Original version in Italian. "Interfacce dell'incompletezza." *La Matematica* 4. Einaudi: 2010. Print.See also Giuseppe Longo. "Mathematical Infinity 'in prospettiva' and the Spaces of Possibilities." *Visible: A Semiotics Journal* 9 2011. Print. Italian version in *Dianoia: Rivista di Filosofia* 19. Editions A. Angelini, 2014. 17-19. Print.

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15. But see, for an overwhelming auto-critique, Robert A. Weinberg. Op. cit.

16. *Ibid.*

17. Ana Soto and Carlos Sonnenschein. Op. cit.

18. Giuseppe Longo and Nicole Perret. Op. cit.

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Ideas of Savage Reason: Glass Bead in Conversation with Martin Holbraad and Eduardo Viveiros de Castro

Martin Holbraad,

Eduardo Viveiros de Castro

In recent years, under the heading of the *ontological turn*, anthropology has mobilized the metaphysical category of ontology in what appears to be, firstly, an attempt to sublate the *crisis of representation* that problematized ethnography as an ultimately impossible task and, secondly, a refusal to reduce anthropology to the ontologization of human knowledge in the psycho-cognitivist style. The origin of this 'turn' is generally located in the work of French anthropologist Philippe Descola, who notably advocates for a structural inversion between the Naturalist (modern) ontology and the Animist (non-modern) cosmography, where one can be read through the lens of the other in the very project of anthropology: here, Naturalism supposes the continuity of physicalities (postulating a "Mononature") and produces discontinuities at the level of Culture (postulating a "Multiculture"), while Animism supposes the continuity of Culture or "soul" ("Monoculture") and sees discontinuities in Nature ("Multinature"). As Roy Wagner puts it, European praxis "makes souls" against the backdrop of a given material continuum; indigenous praxis "make bodies" against the backdrop of a given sociocultural continuum. In this model, we don't have mind (or culture, or language) on one side, and being (or reality, or the world) on the other, but rather various ways of

being, or various ways of treating nature. Anthropologists Martin Holbraad and Eduardo Viveiros de Castro discussed with us the implications of such a 'turn' in the articulation of universality and diversity.

Araweté shaman bringing down the dead and the gods to partake of a tortoise banquet, Ipixuna, Pará, Brasil (photo by Eduardo Viveiros de Castro, 1982).

Glass Bead: Anthropology doesn't accept anything as being generally true of all cultures unless the imaginaries, cosmologies and collectives it studies are equally seen as *variants* of each other: nothing could seem further from classical metaphysics. Still, for you the notion of being appears as the most powerful of the comparative operators under investigation: in your words, the aim of anthropology is to produce "equivocations" between ontologies, and its practice is cast as a "comparative ontography." Not the comparison of ontologies, but comparison as ontology, in what appears to be less an ontology of comparison than a series of variations applied to the very domain of ontology. Can you describe the ways in which ontology—or rather, the ontological—ought to integrate the discourse of anthropology?

Martin Holbraad: I'm not sure these ideas necessarily all go together, or whether, at any rate, I can speak to them all. Given the nature of the anthropological debate on 'ontology' (a total buzzword by now, with all the problems that go with that), I think your point

about comparison as ontology, as opposed to comparison of ontologies, is a good place to start. Indeed: the idea that if anthropologists are interested in ontology it must be because they want to chart and compare different 'ontologies' has proved incredibly hard to budge for those of us who propose the concern with ontology, not as a new way of configuring the object of anthropological inquiry, but rather as a different way of imagining the nature of that inquiry—its coordinates, its modus operandi, and ultimately its 'point.' The misreading is hardly surprising. In anthropology (and I guess the same may go for other fields) this is what 'theory' has tended to look like: a tussle about how to think of our object of study: is it culture, social structure, habitus, ideology, experience, praxis, values, cosmologies, collectives, deep structures, cognitive schemes? So when anthropologists bandy around 'ontology,' it is assumed that this must be put forward as a proposal for a new object of study. Indeed, some of the people who are associated with the so-called ontological turn in anthropology do just that, e.g., Philippe Descola's project of identifying ethnologically "basic assumptions as to what the world contains and how the elements of this furniture are connected"[1] and articulating comparatively four possible sets of them, or Michael Scott's search for "root assumptions … concerning the essential nature of things and their relationships,"[2] which, confirming the terms of your question, he calls "comparative ontology." The lesson I took from Eduardo's landmark essay "The Relative Native,"[3] which in my view is the most explicit statement of an altogether different concern with ontology—which I share—is that 'ontology' for us anthropologists designates not an object of inquiry, but rather the kind of 'problem' such objects pose to us. In fact, the thought goes, the very reason for which we should give up on deciding between 'culture,' 'structure,' 'praxis,' or what-have-you, as the rightful object of anthropological inquiry, is that the most basic problem any given object of inquiry poses to the anthropologist is that of deciding *what it might be* in the first place. So if ontology integrates the discourse of anthropology, as you put it, it does so by rendering anthropological 'questions' as ontological ones. I'll try to show some of the implications of this, hopefully with some examples too, as the discussion develops.

Eduardo Viveiros de Castro: Coming "deuterologically" after Martin, I have the privilege of not having much better to say. So let me try to say more or less the same as Martin did with a difference. Let me start with the c*omparison of ontologies vs. comparison as ontology* contrast. Some of my writing on the polemical theme of 'ontology' may occasionally have given room for aligning my position with the *comparison of ontologies* pole. For example, the stark contrast—deliberately provocative and therefore outrageously simplistic—*multiculturalism vs. multinaturalism* could be read as positing a

great divide between two major ontological orientations, namely, Modern Western and Amerindian, conceived as two opposed sets of fundamental presuppositions about the nature of 'reality' and the place (epistemological as well as ontological) of humans in 'it.' In fact, though, the contrast was meant to distinguish two opposed 'anthropological' outlooks, two anthropological ontologies, by which I mean at the same time, two ways of *doing anthropology:* (i) Western ortho-anthropology as the description of the sundry different human-cultural-spiritual ways of representing ONE reality-nature, versus another anthropology, the Amerindian hetero-anthropology as the nonrepresentational positing of a multiplicity of corporally-specific perspectives which 'constitute' reality (in the sense of being the stuff the world is made of); (ii) anthropology ("our" anthropology, the academic discipline engaged in the business of describing diverse human representations of both human and nonhuman Nature) as engaged in the comparison of *itself*—Western metaphysically-derived conceptual repertoire—with alien anthropologies that may turn out to have an entirely different set of conceptual presuppositions, including, crucially, different notions of *anthropos* and *logos*. This gives anthropology an 'ontological' quality or 'twist' ('turn'), insofar as its task is now to compare conceptual 'languages' without presupposing a concept-independent, 'exterior' ontological realm of *realia* that could serve as a baseline for the comparison. Anthropology becomes a game with no superior arbiter or impartial umpire, a game whose rules change as the game goes on. "Comparison as ontology," to my mind, means two things (again): (i) comparison collapses the epistemic and the ontological (word and world), as it sets as its task that of establishing the conditions under which alien concepts can be "translated" into our own conceptual language without having to leave the world they necessarily' carry with them at the door; (ii) 'ontologies' only become understandable as continuous and contingent 'variations' (i.e., 'comparisons') of one another, both within and across those objects we used to call cultures, societies, cosmologies or intellectual traditions. Anthropology, through comparison, becomes a method, or perhaps a process, to discover difference and variation and to transform difference and variation into *what there is*: 'being' is *being able to be other, being virtually other.* Anthropology is not in the business of adjudicating on the correctness, consistency or even the proper grammatical 'number' of the noun 'ontology' (ontological monism vs. ontological pluralism, ontological monarchy vs. ontological democracy, etc.). In that sense, it is ontologically agnostic, or better yet, anarchist. 'Ontology,' as far as anthropology as an ontologically comparative endeavor is concerned, starts from, and with, the methodological principle according to which *we do*

not know what being is without having first engaged in ethnographic (ontographic) fieldwork. 'Ontology' thus becomes an 'outdoor science' like field ecology or natural history.

GB: The ontological turn of anthropology seems to share some ground with various forms of contemporary thought characterized by the attempt to undo or overcome the transcendental turn of modern metaphysics and to resuscitate the precritical notion of reality in which humans are not subjects but one of many "actants." If Kant took the category of thought to be universal, the critical project of structuralist and poststructuralist thought can be said to have sought to relativize and historicize this position, by maintaining that there are multiple and irreducible ways to apprehend the world, relative to cultures, subject positions, or "worldviews." Where Kant built his theory in terms of the features intrinsic to any cognition, structuralism and poststructuralism often externalized this view, casting it in terms of discursive regimes, ideology, or linguistic practices. Despite its alleged departure from Kant, some forms of structuralist and poststructuralist thought in anthropology seem to have nonetheless reproduced the logic of its position, claiming that the real is accessible only as mediated or constituted by discourse, epistemic constructions, etc. How do you cast your projects with regard to the complex debt of anthropology towards Kant?

MH: Following Durkheim, the trend in anthropology is to think of 'categories' as objects of empirical investigation: the 'x' take time to be linear, while the 'y' take time to be circular, and our job as anthropologists is to collect data on the x and the y in order cogently to describe their respective 'temporalities' (understood ipso facto, as you say, as relative and historical). One could note that the term 'category' here tends to be used loosely, to include much more than Aristotle or Kant ever had in mind, including such things as concepts, assumptions, generalizations, schemes of classification, patterns of reasoning or even behavior—pretty much anything… Still, the point is that this idea that something even remotely equivalent to Kantian "categories of the understanding" could be rendered as objects of empirical description raises a majorly 'critical,' if you like, query: if these empirically describable categories are meant to vary from one place or time to another, then what kind of categories would WE need in order to describe them in any given case? There appear to be two options. Either we have (or could develop) a repertoire of "categories of the anthropological understanding," let's call them, which could encompass all possible empirical variation of indigenous 'categories'; or, alternatively, we would have to accept that, in some instances at least, the variation we wish to describe might be inconsistent with the categories we can use to describe it, in

which case our attempt to describe our varying ethnographic object would have to involve developing new anthropological categories for understanding it in any given case. The former option is interesting—it has something deliciously Aristotelian about it: the terms of anthropological description attain the status of 'categories' inasmuch as they become irreducible—i.e., the lowest common denominator of all the putatively varying indigenous ones. But note that this renders ethnographic variation superficial and derivative. The latter option, on its part, has something Kantian about it, since it adds to the task of ethnographic description a component reminiscent of *transcendental deduction*: what categories (though now I'd just call them concepts) do I as an anthropologist need in order sensibly (e.g., free from logical inconsistency) to describe my ethnographic material? E.g., what concept of time do I need in order to describe the putatively *circular time* of the x? What kind of thing must time be for me to be able to say, for instance, that the x take past events to return to the present, when, I take it, the whole point about past events (what makes them 'past') is that they're gone forever? To the extent that there can be as many of these kinds of Kantian-sounding questions as there are ethnographic variations of such a concept as time, say, what we have here is a rather strange, but to me exciting, Kantian 'relativism,' with categories of the anthropological understanding multiplying in different directions through their exposure to ethnographic variation. And note, of course, that the manner of transcendental questioning that is required to set this multiplication in motion is ontological in the sense I indicated earlier: what must I take time *to be* (or *not to be*, for that matter) for my description of the ethnography of the x to make sense, is the question.

EVC: If we are (if we were) to stick to the Kantian project, I would observe that anthropology has always concentrated itself on Kant's transcendental aesthetics and transcendental analytics (forms of sensibility plus categories of the understanding), even as the *anthropological turn* moved, starting with the French Sociological School, towards the empiricization and historicization of the transcendental (social time and social space, mana as the ancestor of the category of causality, Foucaldian epistemes as modes of the *historical a priori*, etc.). So, just to carry on with the Kantian vocabulary, I would suggest it is about time anthropology starts to confront head-on the empirical (ethnographic) deconstruction of the transcendental dialectics. We should be studying the *ideas of savage reason*, not just the "categories of the savage understanding (mind)." This would imply, of course, rejecting the purpose of transcendental dialectics, namely, the famous critical ban on "going beyond sense-experience." In other words, we must, in a sense,

revert to a precritical 'critical' attitude towards the Kantian project, in order to reestablish "the transcendent" as a legitimate domain of speculation. After all, what are "institutions" like shamanism or divination, if not sui generis modes of speculative thought (shamanism as speculative oneirism, divination as speculative logics) that delve into what Kant dubbed the transcendent realm? One way to go beyond the Nature/Culture dualism that has been plaguing us since the dawn of Modernity is to thoroughly reconceptualize the notion of *Supernature* along non-Western, non-scholastic, non-Christian lines. Latour's "mode of existence" that he calls Metamorphosis (see his *An Inquiry into Modes of Existence*) may offer an interesting starting point, the more so as—this is explicitly acknowledged by Latour himself—such "mode" is ontologically devalued or underdeveloped by the "Moderns" (it is reduced to the interiority of the subject's unconscious), on the one hand, and is totally heterogeneous to the mode he calls Religion, on the other hand.

GB: If indeed the role of anthropology is not the study of representations anymore, but rather the study of ontologies, what is the role of the natural sciences (historically determined, as a matter of fact, by a Naturalist ontology) in your project?

MH: Much as I respect natural science in its own terms (and for all sorts of other reasons, albeit not uncritically), for me the most urgent task for anthropology in the twenty-first century is to stop thinking of itself by analogy to it. Very roughly speaking, I take the whole image of anthropologists as charters of the *sociocultural world around us*, in all its 'complexity' and 'variation' and so on, to be exhausted after an excellent innings, as the Brits say, of a century. There are myriad other ways to think of what we do as anthropologists, and exploring them in no way entails (necessarily at least) parting company with such cherished things as truth, method, discovery, rigor, argument, analysis, consistency, cogency, or whatever it is we think marks us out as serious people doing work that's worth doing. Take for example the image of anthropology we've been discussing. Before I compared it with Kant because you invited us to do that, but I could just as well compare it with the rigors of, say, Grotowskian theater-making. Imagine that, roughly, as the task of training actors' bodies to be so versatile as to be able to take on any theatrical character a play might throw at them: every bodily habit that gets in the way of taking on, say, Agamemnon must be painstakingly worked on in order to allow the space for that character to be embodied and, thus, expressed. It is just that order of rigor, and the kind of truth that emerges from it, that anthropology too can aspire to: let's train our thinking—or whatever it is we *use* as anthropologists—to be so versatile as to be able to 'take on' (i.e., express, convey) any ethnographic materials life throws at us. And that, I

suggest, involves above all working on our habits of thinking about what the things we encounter in our ethnographies might 'be'—ontological habits that tend to get in the way.

EVC: Here I will just take the liberty to quote (not verbatim) something that I heard from Patrice Maniglier, one of the few contemporary philosophers who takes anthropology very seriously. Maniglier suggests that what physics has represented to all the other natural sciences and, more importantly, to philosophy as well (from metaphysics to political philosophy to ethics) since the Scientific Revolution of the seventeenth century—namely, the role of a Model, a sort of epistemic Ego-ideal—is bound to be played by anthropology in the present century. With its central intuition that "being is being a variant" (Maniglier is a Deleuzian structuralist, like yours truly), anthropology sets a conceptual agenda that may—just may, of course—become crucial for the Anthropocene epoch.

Training at Jerzy Grotowski's "Laboratorium" in Wrozlaw, Poland (1972, all rights reserved).

GB: This issue of the journal mobilizes Castalia, a fictional province dedicated to the synthesis of knowledge in Hermann Hesse's *The Glass Bead Game*, as a hyperbolic image of the ways in which humanism figured the project of reason of Western modernity. We'd like you to elaborate on the situation of what you call "comparative ontography" (and the distribution of agency therein) in relation to several threads of contemporary philosophy proposing to widen or reduce the *circle of the human*, namely antihumanism (according to which the human subject, classically understood, is not necessarily to be conceived as the privileged bearer of rationality), transhumanism (according to which humans are not the only rational agents), and post-humanism (according to which rationality extends itself beyond the human's biological and symbolic terms). Could you situate your projects with regard to those schematic (albeit predominant) polarities of contemporary thought?

MH: It's a good question because I think a lot of people tend to see a basic continuity between the kind of approach we have been discussing here and the broad trend in social theory at large (including many anthropologists, STS scholars as well as philosophers) to play around with, or even erase, the distinction between humans and nonhumans, to use Bruno Latour's language. For me, the alliance is a fragile one. To the extent that recent revisions of the human/nonhuman distinction express a broader willingness to deny or otherwise experiment with ontological axioms in general, their resonance with the kind of anthropological program we have been discussing here is certainly there. But again, there's also a basic distinction to be made. In my reading, a lot of the works associated with the various terms you mention—'posthumanism' perhaps captures the trend as a whole—are revisionary: their aim is to replace the ontological framework of humanism with something else, presumably something better. The ecological politics and ethics that often drives this agenda bears this out—the idea being that the 'modern' anthropocentrism of humans vs. nonhumans constitutes the ontological premise of our current ecological malaises, and must therefore be urgently replaced by a less self-centered metaphysics that will create the ontological conditions for a better future. For me—and here I may be in disagreement with Eduardo—these questions of political, ethical or indeed ecological virtue are external to the categorical imperative of anthropology (I'm joking with Kant), which, as we have said already, is that of keeping constitutively open the horizon of what is conceptually possible. That is simply the decision of *refusing to decide*, much less legislate, as to which ontological regime is better or truer, e.g., is it humanism or anti/trans/post-humanism? Our job as anthropologists, according to this image, is to find ways not to decide on these things, in order the better

to be able to allow the materials we study—our ethnographic exposures –to decide, as it were, for themselves. As human beings (or anti/trans/post-human beings for that matter) we may perhaps decide what we want. But as anthropologists we can't. We are meant to be conduits, not legislators, and our job is to help to express things, not to recommend them.

EVC: Well, not wishing to start a long (uncontrolled) equivocal dialogue with Martin here, I'll say that no effort to problematize the concepts of *anthropos* and *logos* (and the institutional apparatuses related to them) is foreign to anthropology as I (we?) understand it. I am in deep sympathy with currents of thought that seek to finish with the *state of ontological exception* (self-)granted to "Man" in the Modern era, the catastrophic political and ecological consequences of which is unnecessary to dwell upon. When the chips are down, it is not so easy to separate one's role as an anthropologist from one's predicament as an Earth being, a Terran. I would not wish anthropology to become a new transcendental arbiter that sets *no legislation* as the new rule of law. I am of the opinion that those new trends—not *all* of them, by any means—are actually allies of the anthropological position I (we?) defend. *Political* allies, I mean, i.e., people with whom one can find points of tactical, if not strategical, agreement. But epistemology and politics are just two names for the same thing. An anti-equivocal synonymy, if you will.

GB: Together with Morten Axel Pedersen, you wrote a text titled *The Politics of Ontology: Anthropological Positions*,[4] in which you claim that "the politics of ontography resides not only in the ways in which it may help promote certain futures, but also in the way that it 'figurates' the future in its very enactment." Can you explain the main ways in which the move away from representationalism and the mobilization of the register of "figuration" can have traction in the domain of politics?

MH: I guess my question for anthropology is how it can be 'political' without importing from beyond its own terms of inquiry criteria of good and bad politics, let alone ready-made definitions of what counts as being political in the first place. Can we in fact refuse to decide on anything beyond what our ethnographic engagements require, as I have suggested, without thereby being profoundly apolitical or even conservative? My own answer takes the form of something rather reminiscent of the Cartesian method of doubt. (We did Kant already, so why not invoke as approvingly that other supposed philosophical baddie?) If the *no a priori ontological decisions* imperative serves to denude the analytical terrain in order to allow space for ethnographically driven alterity to operate, then it works rather like Cartesian doubt: Don't take anything for granted. But

where Descartes ended up, of course, was in having to take for granted the very act of refusing to do so. Now, as we have seen, the anthropological 'cogito' too, if you like, has a structure of its own: it is 'constituted' by keeping open the possibility of difference. So the question then is what 'politics,' if any, such a manner of inquiry may itself instantiate. In other words, if we accept that anthropology is par excellence in the business of giving expression to difference, then whatever characterization we give *that* as a political act would count as having emerged directly from the terms of anthropological inquiry, rather than being imported from elsewhere. In the piece you mentioned in your question we pointed out that this way of thinking makes anthropology an inherently antiauthoritarian discipline. And we even used the word 'revolutionary' in that context, which I think annoyed some people who prefer to measure revolutionary credentials on the scale of activism and commitment to already established revolutionary causes. To be perfectly honest, having come of political age in Greece in the 1980s (Alexis Tsipras was in the year below me in school), this kind of revolutionary brow-beating holds no excitement for me. Certainly, as far as anthropology goes, I am much more interested in a different sense of political action, which is expressed most forcefully by Adorno in his account of the musical significance of Schoenberg's serialism. At issue there was the instantiation of radical difference—and in Schoenberg's case certainly wholesale musical revolution—in the form of one's own labor. And that, in my own case, I guess would be anthropology: the form of *its* labor, which we have been discussing throughout this interview.

EVC: Well, no quarreling with that. I just do not want to make anthropologists sound like those scientists who say that 'science' (and technology, the ultimately important practical consequence of science) is politically neuter, everything 'political' hinging on the uses others (non-scientists) make of it. The non-decouplable political aspect of anthropology lies not in its vouching for this or that ontological outlook, but in keeping all (ontological) options open as a matter of principle. If it belongs to the essence of anthropological 'objects' (very broadly speaking) the capability of being otherwise (sensu Povinelli), this means change—political, theological, economic change and what have you—is always on the table. But of course, just as "you don't need a weatherman to know which way the wind is blowing," as Bob Dylan famously sang, then we sure do not need anthropologists to tell us that European-born capitalist civilization is in its death throes, and is taking the planet with it to a very bad place, as far as many species (including our

own) are concerned. Anthropologists just help us focus our gaze elsewhere ('otherwise') and show what is out there—show that there are *a number of other possible worlds* out there.

Interview conducted for Glass Bead by Vincent Normand.

Footnotes

1. Philippe Descola. "Modes of Being and Forms of Predication." *HAU: Journal of Ethnographic Theory* 4(1) 2014: 271-280. Print.

2. Michael W. Scott. *The Severed Snake: Matrilineages, Making Place, and a Melanesian Christianity in Southeast Solomon Islands.* Durham, NC: Carolina Academic Press, 2007. Print.

3. Eduardo Viveiros de Castro. "The Relative Native." *HAU: Journal of Ethnographic Theory* 3(3) 2013: 473–502. Print.

4. Martin Holbraad, Morten Axel Pedersen, and Eduardo Viveiros de Castro. "The Politics of Ontology: Anthropological Positions." *Fieldsights—Theorizing the Contemporary, Cultural Anthropology Online* 13 January 2014. Web.

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The Photographic Real

Tristan Garcia

The Ontology of Photography

Starting in the 1850s, photography became the principal purveyor of the real in our representations. Personal memories as well as the visual arts, cosmology, microscopy, medicine, administrative identity, eroticism and pornography, war reporting, historical reconstruction, legal testimony, and advertising, all developed by relying on a naturalist attitude[1] of ontological trust in the photographic product, ceaselessly furnishing the given real (*donné réel*) to various disciplines that manipulated representations. We might advance the idea that the visual modernity inherited from the nineteenth century relates in large part to the formula that the real is what is photographed, and representation is what one does with it.

For this reason, the *ontology of photography* played a prime role from the start: it was indeed necessary to give an account of the real being of what entered into a photograph, and to conceptualize and name what in a photographic image is communicated of reality. We wanted to be assured that when we are dealing with the photographic, we are actually dealing with something real that is captured by an image, which we then have time to work over and treat, for either aesthetic, scientific, informative, or political purposes.

As distrustful as we may be today about the construction of images, the fact that photography has served as the universal material of our visual representations may only be explained if we understand that we have never stopped acknowledging in photography something that escapes our constructions, something that was *given* to us.

However, after more than a century and a half of the ontology of photography, we have to admit the desperate situation into which the very concept of photography has fallen. The current situation has pushed into a corner all those who still think that photography is at an impasse—or rather, it has sent them back to a terrible dilemma. The first option is to recognize that the ontological trust granted to the photographic was an illusion from the start, and that there was never any real given in photography. The second option obliges us to name this given real, which unfortunately reveals our incapacity to make this kernel of reality resistant to destructive doubt. Everything that seems designated as pure reality in a photograph increasingly appeared in the course of the technological mutations of the photographic medium, as the complex product of an optical device and our gaze (it is our gaze that attributes to photographs a coefficient of reality that they do not possess in and of themselves). We feel caught in a trap. To understand the origin of this dilemma, we have to go back to the history of the ontology of photography, as we go back up a river, in the hope of finding a single concept of the real that suits all kinds of photography (film or digital) and resists the trend by which any history of photographic thought seems to suffer an interminable military retreat. Overly ambitious positions of realism are gradually abandoned in favor of more modest positions; the realist citadel is on the verge of collapsing—and if it is evacuated, then the photographic will have to be thought of as a particular genre of pictoriality, understood as the simple inscription of lines, and eventually of colors, onto surfaces. But considering the photographic as a genre of pictorial and not as a separate species, is to make photography into a mere technique distinct from stained glass, as stained glass is from engraving, or from oil painting, or from the blown projection of pigments in parietal art. It means admitting that there is no essential difference between inscription by the human hand of ink or ochre or charcoal onto a surface, and the inscription of variations in luminous intensity onto a sensitive surface by the intermediary of a photographic device. But the ontology of photography was born precisely from this feeling—so difficult to explain—of an essential distinction between the pictorial and the photographic, which pertains basically to an inversion of causality between the object and subject of representation.

This is the idea we no longer manage to believe in today. Let us begin our journey back up the river of photographic thought with the simple intuition that at first (in the nineteenth century), the pictorial was conceived as the inscription of lines on a surface, whose cause did not relate to the object represented but to the subject performing the representation. By contrast, in the photographic device, we admit from the start that the

cause (one of the causes, in any case) of the representation is the represented object. Nobody to our knowledge has thought that the object represented in a photograph was the *absolute* cause of the representation, but only that the subject (here the photographer) was no longer the exclusive cause of the representation. To put it simply: in any kind of depiction, the object aimed at is perhaps the purpose of the painting or drawing, but it is certainly not the material cause of the representation. The face of Thomas More, as Hans Holbein paints him, is in no way the material cause of the painting in which he figures. On the other hand, the face of Baudelaire, in the famous portrait that Nadar took of him, enters into a series of causal chains (which obviously must be clarified) that lead to the portrait. The very head of the poet, the form of his skull, the fineness of his hair, act in some fashion on the light, which in turn acts on a sensitive plate, which finally acts on the image obtained.

*

By photography's "given real," we now mean the determination of this causal continuity between what is photographed and the photograph of it. It is this given real that has always been the Holy Grail of the ontology of photography. Thanks to the definition of this given real, it has always claimed to justify the modern trust we placed in the photographic, which is on a par today with the distrust that threatens to conquer our minds.

To avoid reducing photography to a sort of luminous drawing (the reality of which the moderns strangely believed in) we must go back through the history of the ontology of photography in search of a definition of the photographic real that stands up, that resists the movement by which the ontology of photography seems ineluctably to be beating a retreat.

Liz Deschenes, “Gallery 7”. Walker Art Center, Minneapolis, 2014. Installation view. Courtesy the artist, Miguel Abreu Gallery, New York, and Walker Art Center, Minneapolis. Photo by Gene Pittman

Ontological Retreat I: Nature

The first moment in the history of the ontology of photography could be called “naturalist.” By “naturalism” we mean (especially in scholarly circles and among those who first thought about photography) the shared belief that what is essentially given in the photographic image is Nature. In the first texts that tried to define what distinguishes the apparatuses of Daguerre and Niepce from paintings, the frequent recourse to the term *achéiropoiétos image* (“that which is not from the hand of man”) and the recurrent metaphor of the natural writing of light, both indicate the very first ontological status of photography. We were no longer before an image that man took of Nature, but before an image that Nature took of man: photography would allow a

human to have objective knowledge of his face thanks to the art of portraiture; it would reveal a human being who was no longer the subject but the object of the image, which was able to offer a natural point of view of himself.

This is one formulation of this first ontology of photography.

And what in this photographic naturalism allows us to define the continuity of the real between what is photographed and the photograph itself? It is *exact* natural form of things. In a famous speech to the Chamber of Deputies, Francois Arago, the French scientist and politician (1786-1853), illustrated and defended the recent invention of Daguerre by quoting the painter Delaroche:

> *M. Daguerre has discovered the particular screens by which the optical image leaves a perfect imprint—screens where everything that the image contains is found reproduced in the minutest detail, with incredible exactitude and fineness. In truth, it is no exaggeration to say that the inventor has discovered the means of fixing images—if his method conserved colors .... In a word, in M. Daguerre's black chamber, light itself reproduces the forms and proportions of external objects with an almost mathematical precision.*[2]

Thus what is conserved by the photographic image of the real, by the intermediary of light, are the natural forms of external objects, imprinted directly on sensitive plates. The contours of the photograph of a tree resemble in every point of detail the real silhouette of this tree, seen at a certain distance from a certain viewing angle. It is so accurate that we may imagine why the theoretician of the image John Hyman would much later call a photograph an "occlusion shape": "the occlusion shape of an object is what some philosophers called its 'apparent form,' in other words its contour under its silhouette … for example, a circular dish seen obliquely would recover (or be covered by) an elliptical spot on a plane perpendicular to sight."[3] These forms of recovery indicate the possibility of an exact correspondence, term by term, between the natural qualities of physical objects and the qualities of the photographic image, which theoretically has just recovered it.

This exactitude was indeed presupposed by the first amazed theories of photography. Even Baudelaire refers ironically to it, though he prefers the Beautiful (which is the object of Art) over the exact truth of photographic forms (which should be left to technique, "the very humble servant of the arts").[4] However Baudelaire (as well as Elizabeth Eastlake[5] in the same period) was beginning to doubt the perfect correspondence between natural forms and photographic forms.

Naturalist faith in photography, which primarily relates to conceiving of it as a tool of knowledge, will in fact crumble quite quickly, attacked on at last three fronts.
First of all, the proposition that the natural forms of things are said to be communicated by light to the photographic image implies adopting a modern variant of Epicurean physics. Natural things had to be considered to be diffusing in all spatial directions the objective images of themselves—what the Epicureans called "simulacra"—which the eye or mirrors arrests and captures. To consider that photography was a means of "fixing natural images" was to judge that images preexist their being photographed, hence they are constantly diffused in the luminous milieu, and the photographic device merely authorizes catching them on the wing. In effect, the naturalist can scarcely claim that photography *immediately* seizes objects' natural forms, which by definition are located *at a distance* from the lens. Hence the light must somehow transport the natural forms of things through space to communicate them to the photographic device. Outside any conception of the photographic, one must therefore defend a natural conception of the images produced by the things themselves, and not by perception of them. So it becomes indispensable to revive a physical conception despised by the history of optics: images of things are detached from the things themselves, like the tiny filigrees that hit the sensitive surface of the apparatus, which is then simply a new mode of fixing and tearing from the course of time these natural flows of images in ambient space. Of course, everything in modern physics runs against such a representation of light and of images.
The second difficulty encountered by naturalism relates to the evolution of the photographic art: pictorialism (but also the first experimental manipulations, which would lead to the rayograms of the Surrealists and the Soviets), quickly indicates within photographic aesthetics a desire to make *the taking* triumph over the natural given of photography. The effects of blurring, the use of gums, the first montages, and the superimposition of images all tended to weaken the idea of a natural photographic real, communicated objectively and *en bloc* to the image, and instead favored the conception of power relations between something given and something seized or constructed in any photographic act.
The final objection is the most serious for a naturalist ontology of the photographic image: it relates to the failure of the conception of "forms of recovery." In a photographic image there exist no natural forms of things that might by themselves recover the things seen. Nothing is cut out *in itself* in such an image. If one may identify in a photograph various entities distinct from one another, the difference between these entities is not inscribed in the photograph itself, but must be generated by the perception and

consciousness that is brought to the image. Any photograph is a homogeneous surface in which all parts have an equal ontological dignity, such that inside the image there exists no difference in kind.

Ontological Retreat II: Presence

This inaugurated the second phase in the ontology of photography, no longer naturalist, but "presentist," which served as paradigm for any modern thinking about photography in the twentieth century. The ontology of photography gradually turned away from the natural and exact form of things to embrace the much less determined term of "presence," applied no longer to differentiated entities, but to the ensemble of what appears in a photograph. The photographic image no longer attests to the primary or even secondary qualities of objects (size, figure, color, texture, etc.), but to the simple fact that *this* existed, that it was there. What is real in any photograph? Not so much the objective qualities of a being than their existence, prolonged by the image beyond their disappearance.

The modern ontology of photography exchanged an overly ambitious classic realism, which made photography an analogous and perfected technique compared to the human eye, for a more modest realism (but perhaps more intense), which made photography a secular version of the miracle.

In the emblematic essays of Walter Benjamin, André Bazin, and Roland Barthes, we see the desire to believe in the power of photography, which is of course incapable of being the expression of the natural form of things, but yet capable of transmuting the religious hope of resurrection into aesthetic affectivity. This hope is still tinged with melancholy, since the general presence conserved in the image does not prevent the death of any living being that was saved by photography. What is living remains in some fashion present in the image, but it does not remain living. On the contrary, its death is endorsed or anticipated by photography, which is compared by Andre Bazin to embalming.

Of course, Bazin never stopped being a naturalist, and he believed in the objective character of photography, but his ontology indicates a clear inflexion toward a presentist conception. What distinguishes the photographic image above all from the pictorial image is the power it possesses to *make us believe*:"Whatever the objections of our critical mind, we are obliged to believe in the existence of the object represented, effectively re-presented, that is to say, made present in time and space."[6] Fetish figure of the presentist thesis, Saint Suaire of Turin, who "realized the synthesis of religion and photography,"[7] showed that photography arises essentially from *attestation*: it attests to

what was really present. As a mechanical witness, it accomplishes a transfer of presence, tearing from the destructive power of time the presence of what no longer is, embalming it and conserving it in the image.

The final pages of Roland Barthes's *Camera Lucida* represent the best example, the culmination (and at the same time the swan song) of photographic presentism. It incarnates a powerful modern faith in the capacity of the photographic device to accomplish the promises of Christianity, the Eucharist, and the resurrection of the body. Something of Barthes's mother, who had just died, appears almost resuscitated in her photographic image. "The photo of the dead person comes to touch me like the deferred rays of a star," writes Barthes,[8] "and finally the Winter Garden Photograph, as pale as it may be, for me is the treasure of rays that emanated that day from my mother-child, from her hair, her skin, her dress, her gaze."

What has been photographed has caused "to emanate" from itself the luminous rays that are preciously conserved by photography. The presence of Barthes's mother as a child has passed into radiance, which has passed onto the sensitive surface, which has constituted the image. And the image reproduces these rays, as if the loved were still present in the image, as if it were a dead star whose rays touch the eye long after it has died. But unless we understand "emanation" as the magical transmission of presence, the luminous rays that were conveyed by Barthes' mother did not carry along with them the material presence of the young girl—quite the contrary. At the most, we might think that she was present in the luminous rays, just as the cause is present in the effect. But now what do we understand by "presence" (on which Barthes insists in order to affirm that it is not "metaphorical")?

Ontological Retreat III: The Index

The long retreat of the ontology of photography has continued just as if such a conception of presence and its magic step-by-step communication were not a tenable position.

While presentism served as a *modern* ideology of the photographic, the indexical became the *contemporary* ideology. Indexicality is a reinterpretation of the semiotic categories of Charles Sanders Peirce, notably that of the *index* (by Rosalind Krauss,[9] then the diffusion of this model, from the theses of Philippe Dubois in *L'Acte photographique*[10] to those of Jean-Claude Lemagny); indexicality means envisaging the photographic image as an "index" of its real cause. For Peirce, the distinction among three types of signs (or *representamen*)—the icon, the index, and the symbol—rests on the difference between

possible relations between the sign and its object: the icon (for example, a drawing of a tree) is linked to its object by *resemblance*; the symbol is associated with it by *rules* or *laws* (hence by convention, as with the word "tree," which in no way resembles a tree); the index is connected to its object by *causality*. Smoke is the effect of fire, which it indicates and betrays. The footprint in the sand is the effect of the foot, of which it reveals the form.

Rosalind Krauss, in order to characterize not photography but a particular current in American art of the 1970s, reutilized the category of the indexical, which enabled conceiving of photography as the effect of what was photographed. "Photography is an effect that reveals and betrays its cause," writes Jean-Claude Lemagny.[11]

Presentism did not directly confront the previous naturalism, and the indexical position did not confront the precious presentism. Very discretely, even laying claim to its heritage, it performed a simple strategic retreat. To the extent it appeared untenable to maintain that what had really been there in front of the lens was still present in the image, the indexical position revisited the lowering ambitions of presentism, adding a mediation: What is real in photography is not what was, but the *imprint* of what was. Photography as an index would be this physical object that has lost contact with the reality that has left it because it is past, but has conserved *something* from its effective encounter with this luminous reality that has now disappeared: an imprint, in this case luminous.

We see clearly the difference between presentism and indexical theories. For the latter, nothing of the thing photographed is still present in the image, but the image is the real index of what was once there. What is real in a photograph is a certain *effect* of the real. Something real remains in all photographs, but it is significantly distanced, since one never has access in photography except to its effect. But at least the continuity between the real and the photographic image is not totally broken;[12] it barely persists, but it persists just the same.

Ontological Retreat IV: Photonic Imprint

Alas, it seems that the retreat of the ontology photography must be endless. Even the thesis of measured realism has suffered a significant reversal. In Henri van Lier's *Philosophie de la photographie*, it finds itself attacked (correctly) as the last residue of magical thinking, which introduces a link and a continuity where none exist. Henri Van Lier reminds us that nothing of what was represented in the photograph was ever imprinted on the sensitive plate of the photographic device: the face of the beloved never

touched the lens, it was never imprinted (except metaphorically) on the film. Van Lier thus proposes a more exact (but also more reduced) version of indexicality, considering that this alone in a photograph is real: the photonic imprint. The sole real and material continuity between what was photographed and the photograph relates not to the scene, which remains at a distance, forever separated in its fleeting presence, but to the photons, vehicles of the light that, affected by the photographed scene, struck a sensitive surface, upon which it left a material imprint, conserved by the photographic negative.

*

But no quarter will be given the defender of the real in photography, who finds it increasingly remote as he fences to defend and circumscribe it. In a recent article, André Günthert cites an astonished critique by the physicist Jean-Marc Lévy-Leblond of the ignorance among photographic thinkers about the physical process by which phototonic recording occurs:

> *The transparency of a milieu or its opacity … result from a very complex mechanism: the luminous incident photons are absorbed by the electrical charges of the milieu … and set them in motion; these charges then reemit new photons, etc. Thus it is only the result of these iterated processes of absorption and reemission that enables establishing if and how the body lets the light pass, or else blocks it.*

In other words: "The photons that enter into a glass plate are not those that leave it … There has indeed been a complete renewal of these constituents of light within the material."[13]

However, Henri van Lier's defense of a photonic imprint as the minimal formulation of a photographic realism cannot withstand a fresh attack: the photons that were in contact with the faces of our youth are not those that entered into contact with the photographic device, and those that entered the lens are not those that left it.

Thus, nothing that was in contact with the photographed materially enters into the photographic image. If we understand photographic reality as what we might define and call a *continuity* between the photographed and the photograph, then today we seem unable to designate any photographic reality at all.

And if the ontology of photography is no longer able to define such a specific reality, then photography is no longer thinkable except as a genre of pictorial images. Here we have ended up with our initial point: the trust of our natural attitude toward photographic reality is no longer correctly founded on any concept whatsoever. It is merely a habit. As soon as the habit is worn away by time (since it will have no well-founded discourse to

sustain our trust in the photographic) then it will completely disappear. Here we are cornered at the edge of the void upon which it now appears that our conception of photography has always rested.

At the Edge of the Void

At the finale of this step-by-step retreat, the current ontology of photography finds itself like a routed troop at the edge of a cliff, after suffering a protracted withdrawal from the field of the real, along the way abandoning nature, presence, the thing's imprint, matter's imprint, and material continuity.

One possibility is that it jumps, totally renouncing (in the current conditions of production and conception of what is still called photography) an ontological difference between the pictorial and the photographic. It might lay down its weapons and admit that the ontological difference of the photographic was an illusion of modern aesthetics, and that photography consists—neither more nor less than all the other pictorial genres—of lines inscribed on surfaces by certain technical devices. Then it would stop saying how the photographic is distinctive, because it is no longer able to define what in photography comes from a causality that is imputable to the object represented rather to the device of representation.

But then we could have to stop believing in the photographic as the principal purveyor of the real in our representations. We would have to revise our irrational belief in photographic material. This would surely be a painful revision for human culture, and it would long bear the bitter taste of defeat—the defeat of modernity as a whole.

The other option is to refuse surrender. Such a position presupposes our remaining in opposition to everything, with our backs to the void toward which the history of the ontology of photography appears to be pushing us, we *realists*.

Let us try a last desperate movement. Let us wager that this realism is still possible. How could we find a way to hold a last impregnable position, except from a lucid awareness of the price to pay? To conserve realism, we have to sacrifice a notion with which it was associated until now. To keep the real in photography, we have to completely give up something to which the ontology of photography has blindly clung: the material presence of things. The very being of photography in fact invites us to separate realism and materialism. In order to remain a realist about photography, we are barely starting to understand that we must necessarily admit that what is given is not material, but that there does exist a real continuity between the photographed and photography—*which is not a material continuity*.

The Real without Matter

The given real of photography is not the material presence of light but rather a state of matter, specifically of light, and hence of *information*. Charges are exchanged, energy is transmitted, and the result of this energy is passed from photon to photon. Photography is a technical device that precisely makes an abstraction of the singular presence, here and now, of each photon, and extracts from it information (a state of matter) at the encounter between a sensitive surface and a bundle of photonic particles.
Let us sacrifice a little more matter: this bundle of particles in question is not necessarily a bundle of *photons*. If we consider the progress of scanning electron microscopy, it is possible to identify a sort of scientific photography whose resolution descends to the wavelength of visible light, which is determined by photons. We may now take photographic images of minuscule portions of matter, at a scale smaller than the visibility threshold of material objects. In such an operation, the technical device somewhat mimics photography, by organizing the encounter not between a bundle of photons and a sensitive surface, but between a bundle of electrons—in interaction with the portion of matter of which one wants to take the image—and the measuring apparatus. Grasping details on the order of a tenth of a nanometer, scanning electron microscopy cannot be considered "photography" by anyone who would still define photography as a luminous medium. Here, the image appears indeed below the threshold of visibility, below what photons can reveal, but there is still a way of relating to images of the infinitely small just as to ordinary photographs: Simply consider that any photograph consists of the abstraction of a piece of information on the basis of the encounter between a bundle of particles (affected by a state of matter) and a sensitive surface sensible or a measuring surface. For a long time, these particles were exclusively thought of as photons, thus appearing to link inseparably the essence of photography with light. Even though photography remains (and no doubt will always remain) mostly conceived as photonic, scanning electron microscopy shows us that the most general and most correct definition of the photographic does not necessarily involve photons—vehicles of light—but rather all sorts of particles, which a directional flow (affected by the encountered matter) brings to be cut out and recorded on a plane.

*

In any kind of photography, film or digital, retouched or not, there is in fact an infrangible kernel of the real, but this real is not material, but rather a relation (or a series of relations). It is a piece of information abstracted from matter *hic et nunc.* To judge the

photographic in this way means to assure ourselves that—in the current state of knowledge and of contemporary technical devices—we may have a trust in photography that does not risk being betrayed.

Such a realism-without-materialism—which considers that what passes from the real in a photograph arises only from a relation between certain material elements and not from the material elements themselves, or from their presence—has the first beneficial consequence of reunifying photography *a priori.* Instead of wondering about the ontological transformations effected by the shift from film to digital, we should consider that photography has *always* been digital *without knowing it*. It has always dealt with information, not with presence. Of course, the photographic devices of the nineteenth and twentieth centuries could make us believe that photographic images do conserve of the real something other than information; but we must acknowledge that photography introduced the digital, starting in the mid-nineteenth century, into our cultural representations. This is the first victory for our ontology: we no longer have to think of the digital as a destruction (at least partial) of the essence of photography, but on the contrary as the accentuation of its being. We are no longer condemned to read the history of photographic techniques as an interminable succession of reverses, of ontological catastrophes. What today we call digital images are merely the realization of the latent character of all photographic images, which withdraws from light the relations between its elements, which are capable of being transmitted and reproduced.

Information

Here "information" signifies that which, of the material presence of several entities, may be abstracted, treated as a relation, and thus reproduced with other entities (in this case, other photons). From this standpoint, there is no difference between the ontology of sound recording and the recording of light. On the occasion of the recording of a Bob Dylan song in 1964, to maintain that the sound waves that traversed the studio space were captured and conserved in their very presence on the master tape means producing a magical image of the recording, in effect taking metaphors—such as the spectral nature of the recording of voices[14]—as concepts, and being fated in time to feel disappointed and tricked by the reality of the recording. Any mystique vanishes once you think about the recording process.

To be ontologically realist about a recording means not asking it to conserve the nature of things, any more than to conserve presence or matter: nothing of the presence of the hand of Bob Dylan striking the chords of his guitar one day in May 1964 passed

concretely into the recording of the song. The sound waves caused by this movement are not immortalized by this recording: instead, the movement of the air entrained the movement of the membrane of microphones, which entrained mechanically, step by step, the inscription not of the sound wave itself but of certain relations between the sound waves on the magnetic tape. This step-by-step effect of the movements of Bob Dylan's hand and his voice is effectively conserved as a physical object, but to be a realist means to consider that in this transmission, presence is never conserved. On the contrary, the material presence of the voice is abstracted in favor of the relations between the material elements of the effects of the voice. It is these relations that are inscribed, transcribed, recorded.

No recording is merely a technical resurrection. One must not understand a recording as an effect that reproduces its cause. The sound waves caused by the movement of the vinyl disk entraining the arm of the gramophone that plays Bob Dylan's record are not the same sound waves as those that traversed the recording studio in 1964. They are not the same in a precise sense: their material presence differs. It is a matter of other waves, but their relation conserves (at least in part) the relation they maintained with each other on that day back in 1964.

No recording conserves or reactivates the essential qualities of things, or their presence, or their materiality. Quite the contrary, the sole means of being a realist in the face of the challenge offered by recording techniques is to admit that recording always consists of making an abstraction (absenting the material presence) of the qualities specific to the things recorded, and conserving solely the relation (or certain relations) between these things in order to be able to reproduce these relations with other singular material entities, whose presence has nothing to do (except metaphorically) with that of the things recorded.

To think of the ontology of recording, you have to shed any fetishism, any magic belief in the conservation of the present and material presence of things—of the voice, of bodies, of faces. All that, like everything else, is always engulfed by the passage of time, and sees its presence diminish tendentially in intensity as it becomes the past. No living being, in being recorded, has ever been torn out of time. But the composite of several beings together might be replayed with other beings, as one performs the same play with other actors. It is solely by thinking about recording like this that one avoids fetishism—and ultimately the disappointment that always leads to a denial of the given real of a recording. Recording is not of matter, but of information.

Photography and sound recording somehow invented modern information as the conservation of the relation between entities, reproducible at will with other entities. And the modern real that is revealed by recording is in fact information.

Liz Deschenes, “Tilt / Swing”. Miguel Abreu Gallery, New York, 2009. Installation view. Courtesy the artist and Miguel Abreu Gallery, New York. Photo by John Berens.

Recording: Transforming Events into an Object

Thus the character of recording (of sound as well as of light) relates not to the conservation of acoustic or luminous matter, but arises from material information, which occurs by the transformation of an event into an object. To record is to arrest by a device one or several events—acoustic or luminous—in order to make an object. Let me clarify this point. What a photograph captures is an ensemble of luminous events—in this case the passing of bundles of particles, of photons. By extracting relations from these bundles, the photographic device arrests the event, which is no longer taking place. The events that are the encounters by these bundles of particles of a sensitive surface

henceforth appear as an object, a stable portion of space-time. If an event is what is represented in language by a verb, then an object is what corresponds to a noun.[15] Events are "to do" and objects are deeds that are done. Thus an object is identifiable and identifiable through time, whereas an object is what can remain identical. The photograph objectifies real events in the course of their happening, since it extracts luminous information from them. But the transformation of events into objects corresponds to a change in ontology, not to a material transfiguration: it is always possible to sort the world into events and objects. Photography, as a form of recording, is *a machine that obliges the gaze to treat an event as an object*. A photographic image, once it is taken, never totally ceases to be a possible event. We may continue to consider a photograph like an event, hence as an entity that changes with the passage of time. For example, this is the aesthetic effect produced by the works of Liz Deschenes,[16] which are images whose time of revelation is mixed up with the time of exposition: moment by moment, in front of the viewers, the image never ceases evolving. Any photograph, as an event, does not stop changing, even imperceptibly. As an event, the photograph of our younger face, taken years before now, does not date from a decade ago: now it dates from now. Today, it dates from today. It is a continuous doing, not a done deed. The photograph, as an event, is not unidentifiable, it is a process that never stops, and at the present instant it is of the present instant.

However, we see the photographs that we actually have in our hands as real testimony of a past event. We are in effect brought to consider them as objects, hence as identities that are durable, identifiable, and re-identifiable through the course of time. This is the rule of any recording: to record is to produce a device that enables cognition to pass from a world of events to a world of objects. The recorded object may still be considered as an event, but it then loses its capacity to really retain a past event. As soon as I see a photographic image as an actual event, it stops conserving something—real information—of the past. This is the price to pay. And the photograph, as a technical device, permits my cognitive apparatus to see a certain image among events no longer as an event, but as the objectification of several luminous events of the past.

To Represent: To Absent Something from the Present

As a machine to really transfigure the information of past events into a trans-temporal object for my cognition, photography (as well as phonography) is not a materialist resurrection, but a recording that cannot prevent itself from representing. Evidently

Photography is not content with *recording* luminous information: it *represents*, on the occasion of this recording, scenes that engage the bodies, figures, and attitudes of both living beings and landscapes.

If we understand representation primarily as *absenting something present*, rather than as the *presentation of something absent*, then photography necessarily does represent. In effect it consists of absenting the singular presence of matter. Far from actually communicating the natural qualities of objects, either their presence or their matter, photography makes an abstraction of them. It absents presence and materiality from the real *hic et nunc*. Photography is the real luminous abstraction made from its matter. It suffices to conceive of a technical discipline as absenting a portion of presence in order to be able to represent. Thus pictorialism has always consisted of abstracting from space one of its dimensions, and treating a three-dimensional space as a quasi-surface. Any pictorial image (any painting, any drawing) represents first of all what is presented as a surface effect, which obliges our cognition to deal in two dimensions with what in fact has three, hence to abstract a surface from matter. But photographic recording is ontologically distinct from pictorial images in that it does not abstract a surface from matter, but instead information. The pictorial image withdraws from matter only one of its dimensions; the photographic image lifts out of matter its whole presence. It absents everything that was present. It withdraws the relations between elements and matter, which it conserves by reproducing them with the help of other elements. Everything that in matter is not luminous information is absented by photography.

And for this reason, any photograph represents something. By a rational rule of compensation, everything that absents what is there presents also something that is not there. This does not mean that any photograph represents something preexisting, something that existed before being photographed: photography may invent what it seizes. But it cannot fail to *represent* it, that is to say, to present to the eye something that is not materially found there.

There is always a sacrifice at the heart of being in order to be able to represent. This is because the present matter of this fine day no longer exists, because it has not really passed into the image, because the image has absented something of the present. *And this is why something of the absent will never cease being presented by the image*, as long as the image lasts. This explains why I may see in the photograph something other than a code, than abstract information, and why this abstract information makes present to me something—which is not there.

And this is exactly what photography has never ceased purveying since the nineteenth century: information that tears light from presence, that records it, that arrests events and transforms them into an object, which absents from the real its materiality, and which incidentally presents scenes peopled with bodies, faces, and landscapes that are not materially there. Whoever grants to what is photographic a trust based on this reasonable certitude does not risk being deceived or fooled by photographs and their scientific, artistic, journalistic, or even intimate usages. At the end of its long retreat, the ontology in search of a just definition of photographic reality may hold onto (at least for a while) this idea of photography. What truly is photography? It is what taught our perception to untangle reality and materiality in the light of things. It is what has furnished to our modern representations a sort of basic representation, a figure of the real as information of matter. Phonography has given this to us in the sound element, and photography in the luminous element, even if today these particles enable us to accede to an infra-luminous photography. Photography has furnished us with a new form of the image, which makes an abstraction not only of a dimension of space (as drawing already was doing), but of its whole materiality.

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However, if we still want to confuse the *affirmed* real with the matter *denied* by photography, then the whole house of cards of our modern representations will suddenly collapse, and will fall to the level of pre-modern pictorialism. Because of having demanded too much and the wrong things from photography, we will no longer grant photography anything distinct from what we have always recognized as our everyday points, lines, surfaces. This would be an aesthetic tragedy, and turning our backs on all the old modernity as if it had never been more than a gigantic error of judgment. From our entry into the modern era, we will have believed too strongly in photography, and at our exit from that era we will have believed in it too weakly. We will never have proved capable of a perceptive attitude that is just and equal to what photography communicates to us of reality.

Let us try to demand of any photograph nothing more nor less than what it can do: photography is neither a technical miracle of nature nor a simple constructed and manipulable symbol. Finally, let us endeavor to regard everything that has been photographed in this way: as a determined absence of matter that empties the real of everything that was found present there, in order to retain its information, to make it visible.

Translated from the French by Susan Emanuel.
An unabridged version of this text is available of the Research Platform (http://www.glass-bead.org/research-platform/le-reel-photographique/) (french only).

Footnotes

1. In the sense Edmund Husserl gives to this expression: an attitude consisting of making incessant judgments about the being of objects in themselves.

2. François Arago, et al. *Rapport sur le daguerréotype.* 1839. Preface by J. Bérezné. La Rochelle: Rumeurs des Âges, 1995. Print. Quoted by François Brunet in *La Naissance de l'idée de photographie*. Paris: PUF, 2000. 100. Print.

3. John Hyman. "Pictorial Art and Visual Experience." *British Journal of Aesthetics* 40 (1) 2000: 8. Print.

4. Charles Baudelaire. "On Photography" (from "The Salon of 1859"). Quoted in Jonathan Mayne, ed. *Charles Baudelaire, The Mirror of Art.* London: Phaidon Press Limited, 1955. Print.

5. "Far from offering a mirror up to nature—an expression as triumphant as it is erroneous—offers something that although beautiful, ingenious, and estimable for its power of reflection, nevertheless remains subject to distortions and deficiencies, for which there is no remedy," François Brunet wrote in his article devoted to Elizabeth Eastlake. "Et pourtant des choses mineures…." *Etudes photographiques* 14 2004. Print.

6. Andre Bazin. "The Ontology of the Photographic Image." *What is Cinema?* Trans. Hugh Gray. University of California Press, 1971. Print.

7. Ibid. Barthes also mentions this.

8. Roland Barthes. *Camera Lucida*. Paris: Gallimard, 1980. Print.

9. Rosalind Krauss. "Notes on the Index: Seventies Art in America." *October* Autumn 1977. Print.

10. Philippe Dubois. *L'Acte photographique.* Brussels: Labor, 1983. Print. In this book, Dubois says that what we have called the "retreat" of the ontology of photography has three stages: "photography as mirror of the real," "photography as transformation of the real," "photography as trace of a real." The index arises in the third phase.

11. Jean-Claude Lemagny. *L'Ombre et le temps. Essai sur la photographie comme art*. Paris: Nathan, 1992. Print.

12. This is what André Rouillé calls the "continuity of manner between things and images." *La Photographie. Entre document et art contemporain.* Paris: Gallimard, 2005. 615. Print.

13. André Günthert. "L'Empreinte digitale. Théorie et pratique de la photographie à l'ère digitale." *Actualités de la Recherche en histoire visuelle* October 2007. Web.

14. The notion of "hauntology" (invented by Jacques Derrida about the specters of Communism) has been recuperated by the ontology of sound recording. It discussed by Jonathan Sterne in *The Audible Past: Cultural Origins of Sound Reproduction*. Durham: Duke University, 2003. Print. And by Simon Reynolds in *Retromania: Population Culture's Addiction to its own Past.* London: Faber

and Faber, 2011. Print. Moreover, Reynolds cites Bazin and Barthes and takes up all the images of presentism and indexicality and applies them to sound: material continuity, embalming, imprint, the phantom, etc.

15. Francis Wolff. *Dire le monde*. Paris: PUF, 1997. Print.

16. Liz Deschenes. “What is a Photograph?” International Photography Center, New York 2014. Exhibition.

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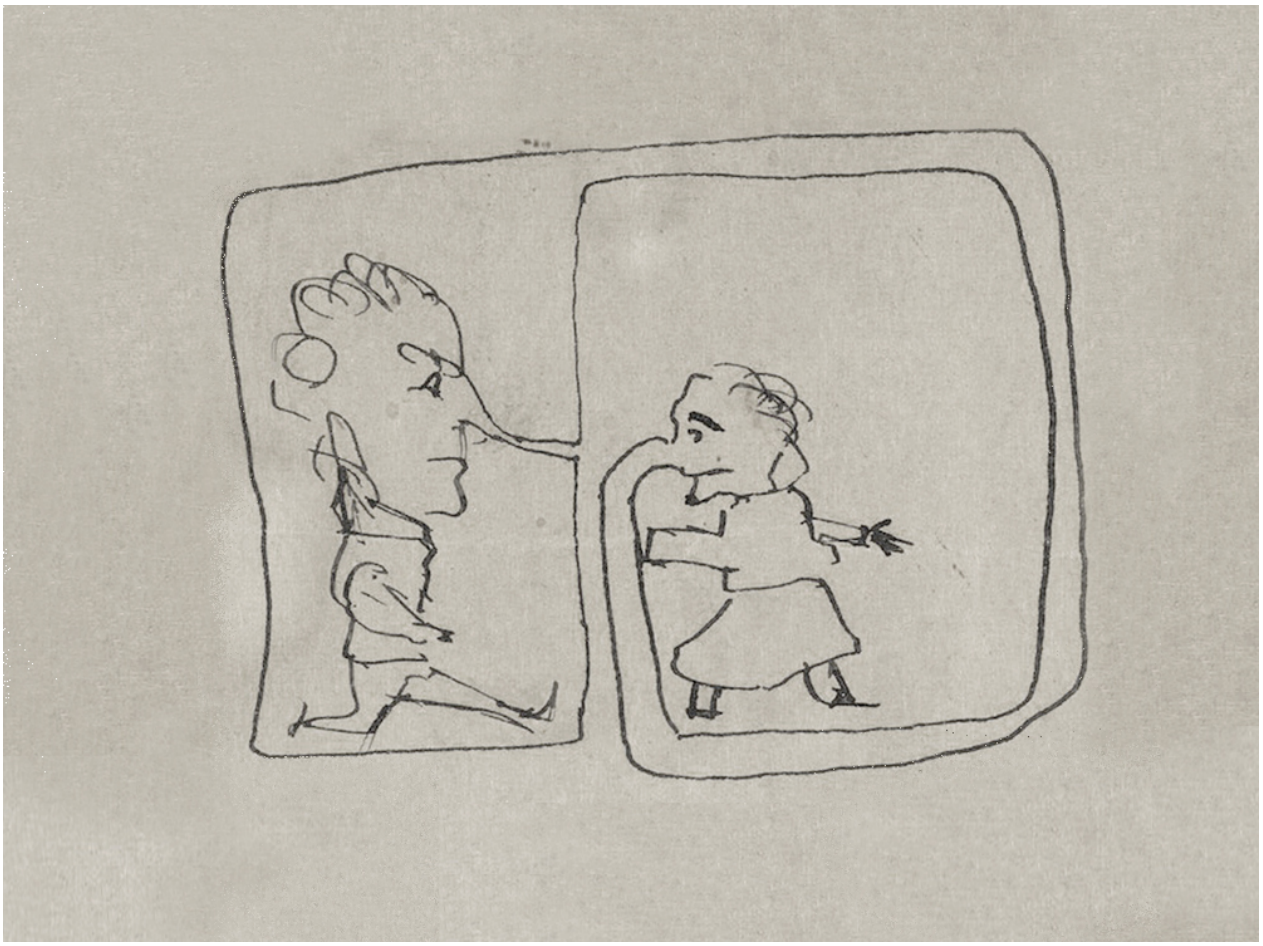
Multilayered Sites and Dynamic Logics for Transits between Art and Mathematics

Fernando Zalamea

According to Pierre Francastel, "Art and mathematics are the two poles of any logic thinking—the major thinking modes of humanity."[1] In fact, since Greek Antiquity, art and mathematics have always nurtured a natural dialogue, forming together a tissue of opposed polarities, fruitful tensions and partial osmoses. Concepts, symbols and materials often separate the artist and the mathematician, but a common strategy—to think and imagine through dialectic, relational webs—brings them together. For Francastel, "As the mathematician … combines schemes of representation and prediction where the real is associated with the imaginary, so the artist confronts elements of representation with other imagination issues. In both cases, the dynamism of a thought that becomes aware of itself by expressing itself and materializing itself in 'signes-relais' ["relay-signs"] extends and encompasses elements of experience and those of the logic of the mind."[2] The *transits* between reality and imagination, the Many and the One, the particular and the universal, the local and the global, constitute the very core of mathematical and artistic creativity. If their *signes-relais* are often different (and, in some cases, the specificity of mathematical *signes-relais* preclude the possibilities the artist has of entering into the realm of mathematics), the *underlying relational protogeometry* which governs the intertwining of the different signs can be extremely close.

In what follows, fragments of that common relational protogeometry will be revealed, and will be applied to an understanding of some strong *weaving dynamics* in contemporary art and mathematics. Referring to *The Glass Bead Game*, Hesse mentions in a 1943 letter how his game and Castalia were meant "not as eternally valid ideals, but

as potential worlds, conscious of their own relativity."[3] Relationality, potentiality, and relativity, are in fact key twentieth-century forces. Contrary to popular interpretation, entanglement and intersection, built over a non-absolute ground, do not necessarily lead to postmodern skepticism. As Knecht writes at the end of his Waldzell encounter with Designori, "The entire life, whether physical or spiritual, is a dynamic phenomenon, of which the Glass Bead Game contemplates its esthetic side, especially through the framework of rhythmic phenomena."[4] Following Castalia's *Magister Ludi*, the mesh of materiality and spirituality, the crossings and echoes along reason and imagination, the intertwined rhythmic spectrum of all senses, the dynamic blend of polarities, are not only still possible, but become really *potentiated* in our transmodern world, as *Glass Bead*'s research platform and journal are demonstrating.



Drawing by Charles Sanders Peirce (The Peirce Papers, Harvard University)

The roots of a unified, non-foundational vision that encompasses art and mathematics as *fragments* of a multidimensional protogeometry of culture can be traced back at least to Novalis (end of the eighteenth century). Riemann surfaces (mid-nineteenth century)

partially solve the tensions and *ramifications* between the Many and the One, in the mathematical domain of complex variables. Peirce's pragmaticism (end of the nineteenth century) offers a general architectonics of knowledge, where phenomenological *obstructions* and transits help to explain the emergence of creativity. If we consider fragments and ramifications as *residues*, or *strata*, and we focus our vision on the history of art, Warburg's *Mnemosyne Atlas* (early twentieth century) provides another main reference to unveil the complex protogeometry of cultural exchanges. Profiting from *dual* definitions of art and mathematics proposed by Focillon and Lautman (mid-twentieth century), we can then set up a faithful panorama of the strong dialectics in play. Finally, through the invention of mathematical category theory and its developments in the work of Grothendieck and followers (end of the twentieth century), deep *non-classical* logics and *non-separated* geometries (sites and sheaves in Grothendieck toposes) can be used to further clarify the oppositions and conciliations between art and mathematics.

The first section of this paper presents diverse forms of dialectics between art and mathematics, following Novalis, Warburg, Focillon and Lautman. The second section explores some tensions between the local and the global, both in art and mathematics, profiting from Peirce's architectonics. The third and final section proposes embedding the local/global dialectics in art and mathematics along multilayered surfaces (coming from Riemann surfaces) and multidimensional sites (coming from Grothendieck toposes), governed by continuous, intuitionistic logics.

1.Dialectics between Art and Mathematics

Due to the unavoidable opacity of mathematical *signes-relais*, *mathematical creativity* is seldom understood outside its practitioners. Nevertheless, a sustained French tradition has delved into the question,[5] revealing the complex weaving of inventiveness in mathematics. From the concrete (multitude of careful examples) to the abstract (general representation patterns), from a precise reckoning of difference (existence and uniqueness theorems in local frames) to all-encompassing integral views (universal structures and mathematical categories), from syntactical restraint (proof theory) to semantic freedom (model theory), from full control (deduction, rational clearness) to glimpses of error (abduction, imaginative mess), mathematics *breaks* all supposedly rigid forms of knowledge. *Plasticity* then becomes one of the essential characteristics of mathematical thought (see *Section 2*, for an understanding of *conceptual mathematical elasticity*—iteration and deiteration—using Peirce's three cenopythagorean categories).

On another hand, Novalis had admonished that, while *science required plasticity*, *poetry required exactitude*. In fact, beyond usual prejudices, *artistic creativity* has been built on extreme accuracy. Imaginal invention synthesizes, in unique images, sophisticated webs of correlations of the image with its surroundings, either material or conceptual. As sorts of *residues* (which recall Benjamin's search for remainders in his Paris *Arcades* project), the images *reflect* and *potentiate* the contexts where they are introduced. An emergence of sense comes often from the surprise effect of accurately distorted, limiting images. Artistic *signes-relais* profit from a forceful materiality that can embed polysemy and multiverse problems in the very rawness of matter. In this way, mathematics and art produce a *first dialectics (A)*, tensioning the field of knowledge in opposite, complementary ways (like the polarities in an electromagnetic field): revealing and universalizing in mathematics, blurring and particularizing in art. What becomes essential is that, in *middle grounds*, both art and mathematics converge: the great, singular artistic *chef d'oeuvre* opening up unexpected universal dimensions, and the great, universal mathematical *chef d'oeuvre* projecting itself in equally unexpected, singular models.

In *La vie des formes* (1934), Focillon suggested a definition of art as the space where *"la forme se signifie"*[6] ("form signifies itself"). Thus, art deals with *forms* which have to be *structured*, in order to obtain their significance. *Inversely*, following a *dual* approach, we may think of a definition of mathematics as the space where *"la signification se forme"* ("signification forms itself"). Even if that quote does not appear explicitly in Lautman's *Thèses* (1937), all his work[7] explains how mathematics deals with *structures* which have to be *formed*, in order to obtain their theorematic force. A natural, *second dialectics (B)* between art and mathematics emerges through these dual definitions. In this way, an understanding of the *fabric of tensions between form and structure* grows to be one of the central problems to be studied in the interrelationships between art and mathematics. As we will see in *Section 2*, dialectics *(B)* can be iterated along several levels—according to Peirce's phenomenological categories and according to transfers along mathematical category theory—which can be explored through *multilayered geometries* and *multivalued logics*.

Novalis had already urged that a superior dialectics has to take into account serious antinomies, and, even beyond clashes of two polarities, has to understand *infinitomies*: Beyond duality, and trivial separation, "science does not begin by an antinomy—or a binomial—rather by an *infinitomial.*"[8] The young genius underlines the importance of an "*inversion* of the three logical principles—from which are derived the three logical

antinomies and the three fundamental problems"[9] (the three principles, according to Leibniz, are the principles of identity, non-contradiction, and sufficient reason). In particular, the problem of understanding the contradiction $p \wedge \neg ()p$ (inverting the principle of non-contradiction, and accepting antinomies) fosters some of the more original insights of the poet. Building on several potentialities of antinomic thinking—"antinomy of intention, project and process … antinomy of concept and object … antinomy of proof and solution …"[10] —Novalis introduces a powerful *relative geometry*, where "time and space are ever interchanging," where "the law of the excluded middle does not apply," and where diverse worlds (interior/exterior, mind/nature, culture/science) are "admixed," forming "part of a continuum."[11]
Mathematics and art do form part of that *continuum*. For Novalis, "creative imagination" is *tri-composed* of reason, judgment and sensibility.[12] Breaking artificial frontiers, going beyond simple partitions and compartments, art and mathematics enter a *perpetuum mobile* space, to be examined through a sophisticated *topology of transits*. A *third dialectics (C)* between art and mathematics faces then the problem of rendering *continuous* the (apparently) discrete oppositions. In his *Mathematical studies on Murhard* (c. 1798), Novalis writes: "In all sciences one has spontaneously to plasticize [*plastisirt*]."[13]
*Trans*itions, *trans*lations, *trans*ferences, *trans*formations, *trans*figurations, are repeated terms in Novalis' writings. The trans/ concept plasticizes all his thinking. Mathematics and art participate strongly in that trans/ philosophy, which, as many cultural movements of the new millennium are showing, is becoming a basic concern of our times. Some alternative journals, open to *non-separated thought*, where art, science and philosophy are well "admixed"—such as *Collapse*, one of the most brilliant adventures of thought produced in the last ten years, and *Glass Bead*, hopefully a brilliant companion in the near future—reflect that trans/ imperative.

Ascent to the Sun (Aby Warburg. 1928. Warburg Library, Cornell University)

Warburg's *Mnemosyne Atlas* (1924-1929) investigates the transformation of images in Western thought and their roots in the Near East. The *Atlas* looks to provide an *orientation* of man's actions inside the weft of culture, and, as the *Mnemosyne* mythological echo suggests, it tries to (re)construct a *site* thanks to an exploration of the *remainders of memory*. For Warburg, the very foundation of the project lies in a precise, creative antinomy: "Image and number as an anti-chaotic polar function of memory serving orientation."[14] Thus, the *very polarity of art* (images) *and mathematics* (numbers) is set to organize, in an explicitly non-chaotic way, all types of *strata, ruins, residues, traces,* proper of historical researches (for a long study on Warburg's connection between antinomic and creative thinking).[15] The *Introduction* to the *Atlas Mnemosyne* unfolds a dozen terms related to "polarité" and "opposition."[16] "The bounding poles of psychic behavior: calm contemplation on the one hand, and orgic fervor on the other"[17] also represent the limiting "regions" of mathematics and art. Along a *dynamical system*, reason and sensibility (or Creation and Life, as in *Death in Venice* [1912]) produce a *fourth*

dialectics (D) between mathematics and art, where the principal issue becomes to situate local residues inside global webs, and to understand their new harmonics (or, better, their *non-harmonics*, either creative[18] or theoretical).[19]

2.Local/Global Transits in Art and Mathematics: A Peircean Approach

When faced with contemporary art and mathematics, we cannot escape a certain *transitory ontology*,[20] that—at first, terminologically speaking—seems self-contradictory. Nevertheless, though the Greek *ontotetês* sends us, through Latin translations, to a supposedly atemporal "entity" or to an "essence" that ontology would study, there is no reason (besides tradition) to believe that those entities or essences should be absolute and not *asymptotic, governed by partial gluings in a correlative evolution* between the world and knowledge. *Bimodality*, in the sense of Petitot,[21] that is, dynamic movement both in physical and morphological-structural space, is related to such a state of things, where "things" have in fact to be replaced by "processes" (functors, natural transformations and adjunctions in mathematical category-theoretic settings, see *Section 3*). Both prefixes (*trans/, bi/*) offer a suitable ground to understand the wanderings of contemporary art mathematics.

Charles Sanders Perice[22] had already imagined (or discovered, according to our variable ontological commitment) a wonderful phenomenological tool, which helps to unravel the *multilayered geometry* of the (trans/, bi/) situation. Phaneroscopy, or the study of the *phaneron*, that is the complete collective spectrum present to the mind, includes the doctrine of Peirce's cenopythagorean categories, which observe the universal modes (or "tints") occurring in phenomena. Peirce's three categories are vague, general, and indeterminate, and can be found *simultaneously* in every phenomenon. They are interlaced in several levels, but can be *prescised* (distinguished, separated, detached) following recursive layers of interpretations, in progressively more and more determined contexts. A dialectics between the One and the Many, the universal and the particular, the general and the concrete, is *multilayered* along a dense variety of theoretical and experimental fibers.

Peirce's *Firstness* detects the immediate, the spontaneous, whatever is independent of any conception or reference to something else. *Secondness* is the category of facts, mutual oppositions, existence, actuality, material fight, action, and reaction in a given world (two uses of the term "category" should not be confused in this article: "category" alone will refer to a philosophical category, following Aristotle; "category-theoretic," "category theory," or "mathematical category" will refer to its technical mathematical sense).

Thirdness proposes a mediation beyond clashes, a third place where the "one" and the "other" enter a dialogue, the category of sense, representation, synthesis. As Peirce explains:

> *By the Third, I understand the medium which has its being or peculiarity in connecting the more absolute first and second. The end is second, the means third. A fork in the road is third, it supposes three ways. ... The first and second are hard, absolute, and discrete, like yes and no; the perfect third is plastic, relative, and continuous. Every process, and whatever is continuous, involves thirdness. ... Action is second, but conduct third. Law as an active force is second, but order and legislation third. Sympathy, flesh and blood, that by which I feel my neighbor's feelings, contains thirdness. Every kind of sign, representative, or deputy, everything which for any purpose stands instead of something else, whatever is helpful, or mediates between a man and his wish, is a Third.*[23]

Peirce's vague categories can be "tinctured" with key-words: (1) *Firstness*: immediacy, first impression, freshness, sensation, unary predicate, monad, chance, possibility; (2) *Secondness*: action-reaction, effect, resistance, binary relation, dyad, fact, actuality; (3) *Thirdness*: mediation, order, law, continuity, knowledge, ternary relation, triad, generality, necessity. The three Peircean categories interweave recursively and produce a *nested hierarchy* of interpretative modulations.[24] A series of *modes and tones* enter the analysis, and, as we shall presently see, when applied to the dialectics *(A)-(D)* between art and mathematics, the series helps to explain their deep complexity. The interest of Peirce's method lies in the permanent *iterative possibility* of his categorical analysis (sequences of the form *n.m.p.q ...* with *n, m, p, q* ranging through 1, 2, 3—see examples below). The iteration allows, in each contextual level *(p, q, ...)*, further and further refinements of previous distinctions obtained in prior levels *(m, n, ...)*. Dynamic knowledge yields progressive *precision* through progressive *prescision*. Intelligence grows with the definition of more and more contexts of interpretation, and the association of finer and finer cenopythagorean tinctures inside each context.

In Peirce's triadic classification of the *sciences,*[25] Mathematics is situated in the first branch (1), along the realm of possibilities. Esthetics appears inside Philosophy (2), and, between the Normative Sciences (2.2), it comes as a First (thus Esthetics lies on the *site* 2.2.1). Art as such does not enter into the space of "sciences", but it emerges as a web of *forms of material creativity*—see our first dialectics *(A)*—which lie on the *sites* 3.2.2 or 3.2.3 (material mediations, in order to force sense—classic art, or action, contemporary art). As a consequence, following Peirce's classification of knowledge, mathematics and art

constitute again a forceful polarity (1 *versus* 3.2.3). Now, an *inverse vision* of the triadic tree affords an interesting transit between art and mathematics. For example, if we place the tree on a sheet (as in Peirce's existential graphs,[26] we look at it from the *recto* (1) or the *verso* (3.2.3) of the page, and we *transit through cuts and ramification points* imagined on the page (which correspond to precise existential graphs *calculi* in Alpha and Gamma graphs), we are then "admixing" in careful ways reason and sensibility. *Iteration and deiteration* techniques along the tree are some of Peirce's major discoveries (with profound consequences in logic, which we cannot expand on here.[27] But without delving into too much technical mathematics, we can easily see that the second dialectics *(B)* between art and mathematics becomes—on the tree—a lattice-theoretic problematic. In fact, on one hand, *duality* is clearly expressed thanks to the *minimum* (1) and *maximum* (3.2.3) numerical indexes of the classification. On another hand, the iteration of mathematics towards art (1 ()→3.2.3), and its inverse deiteration (1 ()←3.2.3), show that a *continuous mediating field* is stretched between the polarities of art and mathematics, as was presupposed by the third dialectics *(C)*. Finally, *strata* and *residues* are well contemplated in Peirce's architectonics, approaching thus our fourth dialectics *(D)*. Through the very iteration of the cenopythagorean categories, objects and concepts lying in a given stratum (*n.m.p.q*...) codify and reflect their upper levels (*n, n.m, n.m.p,* ...), revealing both *transits* and *obstructions* in the iteration/deiteration processes.
The conceptual and practical *back-and-forth* between diverse layers is governed by the *pragmatic(ist) maxim*, which naturally encodes Peirce's categories. The maxim asserts that we can only attain knowledge after conceiving a wide range of representation possibilities for signs (firstness), after perusing active-reactive contrasts between sub-determinations of those signs (secondness), and after weaving recursive information between the observed semiotic processes (thirdness). The maxim acts as a *sheaf* with a double support function for the categories: a contrasting function (secondness) to obtain *local* distinctive hierarchies, and a mediating function (thirdness) to *globally* unify the different perspectives. In fact, a broad, conceptual *differential* and *integral* calculus seems be in action. Peirce imagined a universal lattice of forms to *reintegrate* the Many into the One, the local into the global, the particular into the universal, the concrete into the abstract. It is a strategy that anticipated some basic goals of *mathematical* category theory, where apparently different descriptions of objects in diverse *concrete* mathematical categories (combinatory, logical, topological, algebraic, etc.) are reintegrated through their universal behavior in *abstract* mathematical categories (spaces of definition governed by the existence-and-uniqueness quantifier ∃!). Art, the second

major pole of human thought according to Francastel, *inverts* the strategy, and *differentiates* global canvases. Material existence is reified, hoping that concrete residues will reflect abstract totalities.

3. Multilayered Sites and Dynamic Logics

Hesse's *contamination* of science and literature in *The Glass Bead Game* reifies, in the concrete space of a novel, Peirce's wider *synechism* (from the Greek *syneches*, joining together). One of Knecht's student poems opens up a *geometry of elevation*: "Traversing spaces and spaces ..., the universal spirit does not want to bound us, but to lift us from one degree to another."[28] We are in the presence of a *multilayered site*, from which multiverse visions can be projected to the diverse strata of the architectonics. Our understanding of *contemporary culture* has to be situated in such *multilevel* configurations, emphasizing in particular some key properties: *(i)* non-separation and continuity, *(ii)* multiplicity and ramification, *(iii)* local/global potential gluings. *Non-separation and continuity* refer, on one side, to a topology not forced by points (Hausdorff spaces), thus to spaces where objects (sets) are replaced by processes (sections in a sheaf); and, on the other side, to the mandatory *motto* of our epoch: to reintegrate separated, disciplinary knowledge, as *The Glass Bead Game* novel idealized, and the *Glass Bead* journal tries to realize. *Multiplicity and ramification* refer to the dynamic, magmatic forces of diversity and differentiation which impulse creativity.[29] *Local/global potential gluings* refer to the main *Transmodern* alternative[30] which, beyond just local postmodernism, reintegrates fragments, residues, and ruins, in global *non-absolute* perspectives. Here, the possibility to construct *relative universals* (apparently a contradiction in terms), has become one of the essential guides of our times (see below). As we will see, a sound completion of these properties leads to *dynamic, non-classical* logics which govern the different configurations.

Riemann's theory of functions of complex variable, invented/discovered in his outstanding PhD thesis, incorporate properties *(i)-(iii)* in precise modes. The thesis, *Fundamental principles for a general theory of functions of complex* `variables,`[31] introduces new techniques close to *(i)-(iii)*: a double geometric characterization of holomorphic functions, through Cauchy-Riemann equations and conformality—close to *(i)*; Riemann surfaces, in par. V of the thesis, through a description of *paths* in the surface—close to *(ii)*; and, back-and-forth techniques between global analysis and local expansions, through general integral representation theorems—close to *(iii)*. In simple terms, we may now describe the basic idea beyond a Riemann surface as a partial solution to a Many/One

problem. The idea is to represent a *multivalent* algebraic relation between two complex variables thanks to a *multilayered ramification on a continuous surface* which turns a many-one relation into a one-one (univalent) relation. *Multiplicity is both ramified and glued in a universal surface*. The dialectics between discontinuity (many-valuedness, breaks) and continuity (univalence, gluing) is synthesized in a unifying concept.
If we could construct Riemann surfaces for fragments of culture, we could be able to describe better the four dialectics *(A)-(D)* between art and mathematics (the aim of this paper is just to *suggest* it—no such construction has ever been realized, or even dreamed after Valery.[32] [33] Indeed, dialectics *(A)* could then be sub-determined through projections (universal ()→ particular) and sections/injections (particular ()→ universal), two natural operations on a Riemann surface (see Figure 1, including *modal* operators which model Peirce's Gamma graphs). Dialectics *(B)* could be imagined through the twists (*forms*) of the surface, which represent their associated mathematical smoothness (*structure*). Closer to dialectics *(C)*, the ramification points of the surface (see Figure 1) would be precisely the sites where discreteness deploys into the continuity of the leaves. Finally, according to dialectics *(D)*, the values of a function at isolated points, in each leaf, could be understood as the remainders, or local residues, of the global behavior of the function on the global surface.

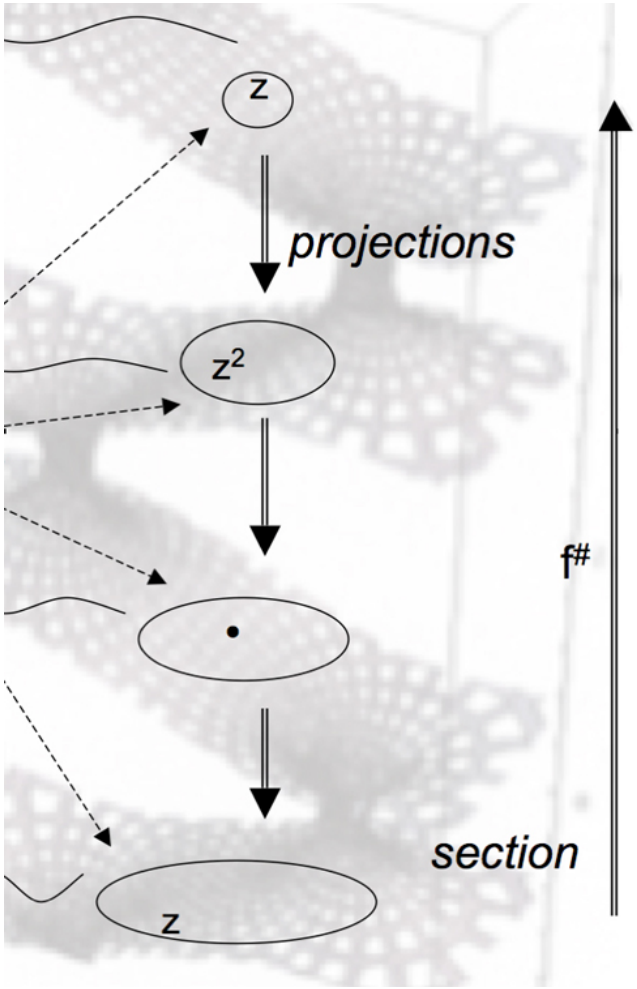


Figure 1. Projections and injections on a Riemann Surface (Zalamea 2010)

As an example, imagine the complexity of Picasso's *Guernica* (1937). We can easily observe that the planar surface of the painting is just an accident of the matter involved, and that the painting has really to be *deployed through many levels* of our imagination. Conceptually and materially, *Guernica* goes well beyond its driven two dimensions, and it is a wonderful construction of a (bi/, trans/) *chef d'oeuvre*. *Guernica*'s geometry lies on a *multilayered site*, which recalls a Riemann surface, with many ramification points (sense and esthetic spreaders) available at the very *corners* of the architectural panels blurred by Picasso[34] for amazing *textural* details on those ramifications). The universality of Picasso's work rests on the extreme *genericity* of its particulars: dialectics *(A)* is at work in its full compassionate force, encoding *all* human tragedies in a sweeping panorama. Universals are projected, and become really *incarnated* in our flesh. The interplay of form and structure—dialectics *(B)*—synthesizes the technical geniality of *Guernica*. The de/formations of figures and animals reveal the de/structuration of panic, death, and sorrow. Imagine that you could *project* them on moving, dynamic Riemann surfaces (as

our mind does with local particulars, wounded mouths, hands, wrists): the pain drawn in a cut or a flame, would be projected into our grief, in turn projected into universal affliction. Following dialectics *(C)*, the singular and the discrete would be *mathematically* part of the universal and the continuous—as they already are *artistically*. Finally, another of *Guernica*'s supreme artistic achievements resides in the complex interplay between local residues (explicit death ruins) and the global destroyed environment (Basque life)—a form of dialectics *(D)*. *Guernica*'s artistic force is completely exceptional, certainly self-contained, but we can see that a dual, conceptual, multilevel geometric synthesis, can also extend its abundant, never-ending polysemous richness.

The eventual interest for culture of modern (1830-1950) and contemporary (1950-today) mathematics consists, not in the partial modelings that mathematics may offer, but rather in its *help to deploy imagination*. Riemann surfaces stimulate visual and conceptual inventiveness. Looking at them (and *handling* them; they are beautiful *material* constructs) allows transits and possibilities that rigid, classical, non-plastic geometries would prevent. In a similar vein, *Grothendieck toposes* (categories equivalent to categories of sheaves over abstract topologies, 1962) constitute *plastic sites*, specifically open to dynamic variations. Grothendieck toposes unify deep insights on arithmetic (number) and geometry (form)[35]. Beyond Cantorian, classical, static sets, the objects in a topos are to be understood as generalizations of *variable sets* (see Figure 2). Instead of living over a rigid bottom, governed by classical logic, they live over a dynamic Kripke model, governed by *intuitionistic* logic. Beyond the classical example of the separated sheaf of holomorphic functions, a sheaf does *not* have to be separated in a general topos: *points do not have to determine their associated objects*. We can even imagine objects without points, defined only through *flux processes*. A wonderful example is the topos of *actions* of monoids. Such a topos has an underlying classical logic (where the law of excluded middle holds and points are essential) if and only if the monoid is a group. Thus, when we deal with structures which are monoid non-groups, the logic of their action is just *intuitionistic*, *non-separated*, closer to topological fluxions, deformations, disruptions.

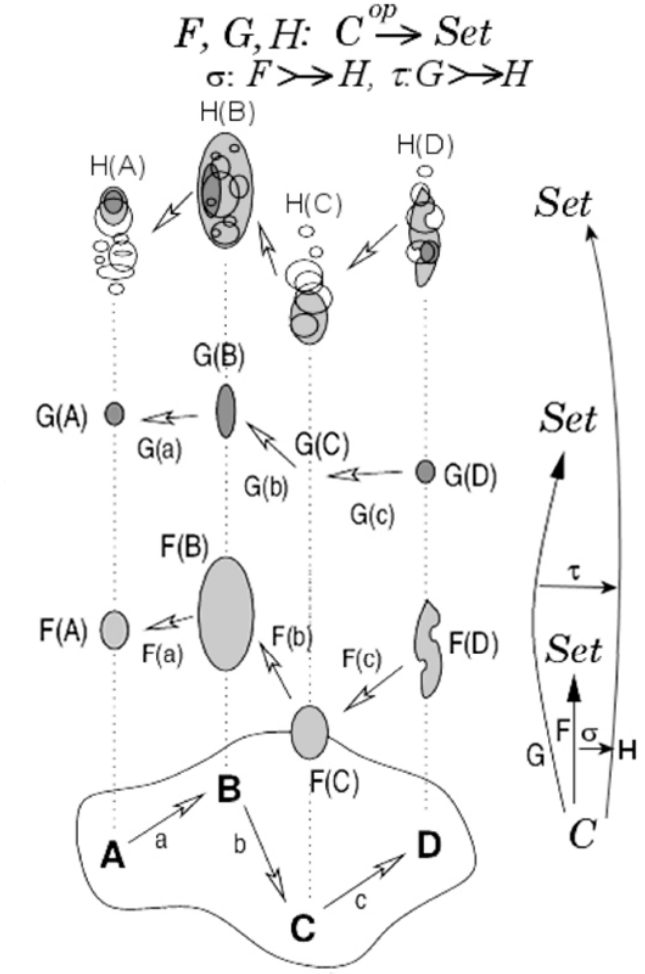


Figure 2. A topos of variable sets (Kostecki 2011)

In a simple *motto*, we may characterize Grothendieck as the greatest mathematician who, after Poincaré, unified Galois and Riemann, the two mathematical geniuses of the nineteenth century.[37] We may thus imagine that, on a conceptual, non-exclusively technical level, Grothendieck toposes generalize Riemann surfaces in some way. Even if the assertion is not mathematically correct (we would have to introduce also Grothendieck's *schemes* into the account), *methodologically* it is fruitful. Figure 1 and Figure 2 show dynamic, relative movements. *Bases change*, no eternal objects are considered. *But* the correlative changes are in turn studied mathematically, and they are incorporated as new objects in an *upper level*. In this way, an *iterated dynamics* emergesa dynamical study of dynamics—which can have a strong influence in cultural studies. As another example, going a little further and *inverting* again our thought, one can deal with toposes whose underlying logics are *dual* to intuitionistic logic. *Paraconsistent logics* (1963) thus appear in the panorama, logics where we can have *local* contradictions *without* forcing *global* contradictions which would destroy the system.[38] It is fairly clear

that the dynamic *logics of art* are either intuitionistic or paraconsistent, but certainly not classical. The dialectics of art and mathematics *(A)-(D)* already hinted at such a situation, but it is interesting to notice that, (1) if we situate ourselves in a multilayered site akin to art, that is, in some sort of non-well-defined Grothendieck topos of *art actions* (compare with the well-defined topos of monoid actions), (2) if we think *dually*—as art should do with respect to mathematics, and (3) if we allow ourselves to live in a continuous *medium* of contradictions, then we will be approaching many of the strongest forms of contemporary art (as in Caro, Kabakov, or Kiefer[39]).

Of course—going against the usual captions which inform us about fictional characters when films finish—we may assert that our indexing (1)-(3) in the last paragraph is Peircean, and it is certainly *not accidental*. Worse: if we read well, *The Glass Bead Game* must have listed already this combinatory possibility in one of its infinite game versions.

Footnotes

1. Our translation. "L'art et les mathématiques sont les deux pôles de toute pensée logique, les modes de pensée majeurs de l'humanité." Pierre Francastel. *La réalité figurative* (Oeuvres, II). Paris: Denoël / Gonthier, 1965. 21. Print.

2. Our translation. "Comme le mathématicien ... combine des Schèmes de représentation et de prévision où le réel s'associe à l'imaginaire, ainsi l'artiste confronte des éléments de représentation avec d'autres qui relèvent d'une problématique de l'imagination. Dans les deux cas, le dynamisme d'une pensée qui prend conscience d'elle-même en s'exprimant et en se matérialisant dans des signes-relais dépasse, englobe les éléments de l'expérience et ceux de la logique propre de l'esprit." *Ibid.* 107.

3. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. xxxvii. Print.

4. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. 110. Print.

5. See Henri Poincaré. *L'invention mathématique*. Paris: Institut Général Psychologique, 1908. Print. And Jacques Hadamard. *Essai sur la psychologie de l'invention dans le domaine mathématique* (1943). New York Lectures. French translation by Jacqueline Hadamard, Paris: Albert Blanchard, 1959. Print. Or Alexander Grothendieck. *Récoltes et sémailles*. Manuscript, 1985. Web.

6. Cited in Jacques Thuillier. *Théorie générale de l'histoire de l'art*. Paris: Odile Jacob, 2003. 65. Print.

7. Albert Lautman. *Les mathématiques, les idées et le réel physique.* Paris: Vrin, 2006. Print.

8. Novalis. *Das allgemeine brouillon* (1798/99). French translation: *Le brouillon général*, Paris: Allia, 2010. 217. Print.

9. Novalis. *Das allgemeine brouillon* (1798/99). Italian translation: *Opera filosofica* II, Torino: Einaudi, 1993. 427. Print.

10. *Ibid*. 403.

11. Brian W. Kassenbrock. *Novalis and the Two Cultures: The Chiasmic Discourse of Mathematics, Philosophy and Poetics*. PhD thesis, New York University, 2009. 191-193. Print.

12. Novalis. *Op. cit.* 1993. 449.

13. *Ibid*. 121.

14. Our translation. "Image et nombre comme fonction polaire anti-chaotique de la mémoire au service de l'orientation." Aby Warburg. *L'Atlas Mnemosyne* (1929). Paris: L'écarquillé / INHA, 2012. Print.

15. Fernando Zalamea. *Antinomias de la creación. Las fuentes contradictorias de la invención en Valéry, Warburg, Florenski*. Santiago de Chile: Fondo de Cultura Económica, 2013. Print.

16. Aby Warburg. *Op. cit*. 54-59.

17. Our translation. "Les pôles limites du comportement psychique: la contemplation calme d'une part, et la ferveur orgiaque de l'autre." *Ibid*. 54.

18. Florian Hecker. *Speculative Solution*. Falmouth: Urbanomic / Mego, 2011. Print and CD.

19. Guerino Mazzola. *The Topos of Music*. Basel: Birkhäuser, 2002. Print.

20. Alain Badiou. *Court traité d'ontologie transitoire*. Paris: Seuil, 1998. Print.

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22. Charles Sanders Peirce. "One, Two, Three: an evolutionist speculation" (1886). *Writings (A Chronological Edition)* 5. Bloomington: Indiana University Press, 1993. 300-301. Print.

23. *Ibid*. 300.

24. Fernando Zalamea. *Peirce's Logic of Continuity*. Boston: Docent Press, 2012. Print.

25. Beverley Kent. *Charles S. Peirce. Logic and the Classification of Sciences*. Montreal: McGill-Queen's University Press, 1987. Print.

26. Fernando Zalamea. *Peirce's Logic of Continuity*. Boston: Docent Press, 2012. Print.

27. See Fernando Zalamea. *Idem*.

28. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. 465. Print.

29. See Laurent Margantin. *Système minéralogique et cosmologique chez Novalis, ou les plis de la terre*, Paris: L'Harmattan, 1998. Print. For Novalis the mineralogist, as a "volcanic" forerunner.

30. Rosa Maria Rodríguez Magda. *La sonrisa de Saturno. Hacia una teoría transmoderna*. Barcelona: Anthropos, 1998. Print.

31. Bernhard Riemann. "Principes fondamentaux pour une théorie générale des fonctions d'une grandeur variable complexe" (1851). Translation of "Grundlagen für eine allgemeine Theorie der Functionen einer veränderlichen complexen Grösse", PhD thesis. Bernhard Riemann. *Oeuvres mathématiques.* Paris: Gauthier-Villars, 1898. 1-60. Print.

32. Paul Valéry. *Cahiers, vol. I (*1899). Paris: CNRS, 29 vols. (facsimile), 1957-1961. I.547. Print.

33. Fernando Zalamea. *Antinomias de la creación. Las fuentes contradictorias de la invención en Valéry, Warburg, Florenski*. Santiago de Chile: Fondo de Cultura Económica, 2013. 65. Print.

34. Pablo Picasso. *Guernica*, vol. 2. Madrid: Ministerio de Cultura / Gran Vía, 1993. 72-73. Print.

35. Alexander Grothendieck. *Séminaire de Géométrie Algébrique du Bois-Marie (*1960-1969). VII volumes (12 parts). Berlin: Springer, 1970-1973. Print.

36. Ryszard Paweł Kostecki. *An Introduction to Topos Theory*. Institute of Theoretical Physics, Warsaw: University of Warsaw, 2011. 28. Web.

37. For an extended study of Grothendieck's work, see Fernando Zalamea. *Synthetic Philosophy of Contemporary Mathematics*. Falmouth: Collapse / New York: Sequence Press, 2012. Print.

38. Newton C. A. Costa. *Logiques classiques et non-classiques: Essai sur les fondements de la logique*. Paris: Dunod, 1997. Print.

39. Fernando Zalamea. "Matemáticas y arte contemporáneo". Ed. Fernando Zalamea. *Rondas en Sais. Ensayos sobre matemáticas y cultura contemporánea.* Bogotá: Universidad Nacional, 2013. 251-267. Print.

Fernando Zalamea (Bogotá, 1959) is Professor of Mathematics at Universidad Nacional de Colombia. Chancellor of Research (1998-2000) of the Universidad Nacional – Sede Bogotá. After his Ph.D. in category theory and recursion theory (University of Massachusetts, 1990, under Ernest Manes), Zalamea has been working in alternative logics, Peirce and Lautman studies, and the philosophy of modern (1830-1950) and contemporary mathematics (1950-today).

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The Turn of the Canoe

Deneb Kozikoski Valereto

> *"I look at Brasília as I look at Rome: Brasília began with a final simplification of ruins."*
> *Clarice Lispector*

Toward the conclusion of "Peregrinations, Visions and the City: From Canudos to Brasília, the Backlands become the City and the City becomes the Backlands," Nicolau Sevcenko briefly reads João Guimarães Rosa's profound short story "The Third Bank of the River," published in *Primeiras Estórias* in 1962. Sevcenko sees Guimarães Rosa's story as a case of the "thematic and formal" investigations of the possibility of "[r]econciling languages expressive of modernity with the specific characteristics of a society still strongly marked by the weight of its colonial past."[1] Guimarães Rosa's narrator tells us about his father, who had a canoe made for him and without notice, rowed to the middle of the river, where he stayed never to leave it again until his son indicated he would take his place. Sevcenko's use of the term 'reconciliation' conjures notions of synthesis and totalities, fragments and irreconcilable pieces, thus instigating the all-too-familiar quandary surrounding modernity and postmodernity. An axis of much intellectual inquiry and debate in the twentieth century, these issues cut across specific territories of Latin American culture. In the introduction to *The Postmodernism Debate in Latin America* (1995), John Beverley and José Oviedo incisively point out that:

> *The engagement with postmodernism in Latin America does not take place around the theme of the end of modernity that is so pertinent in its Anglo-American manifestations; it concerns, rather, the complexity of Latin America's own 'uneven modernity' and the new developments of its hybrid (pre- and post-) modern cultures. (José Joaquín Brunner argues that postmodernism is, in effect, the specific form modernity takes in Latin America).*[2]

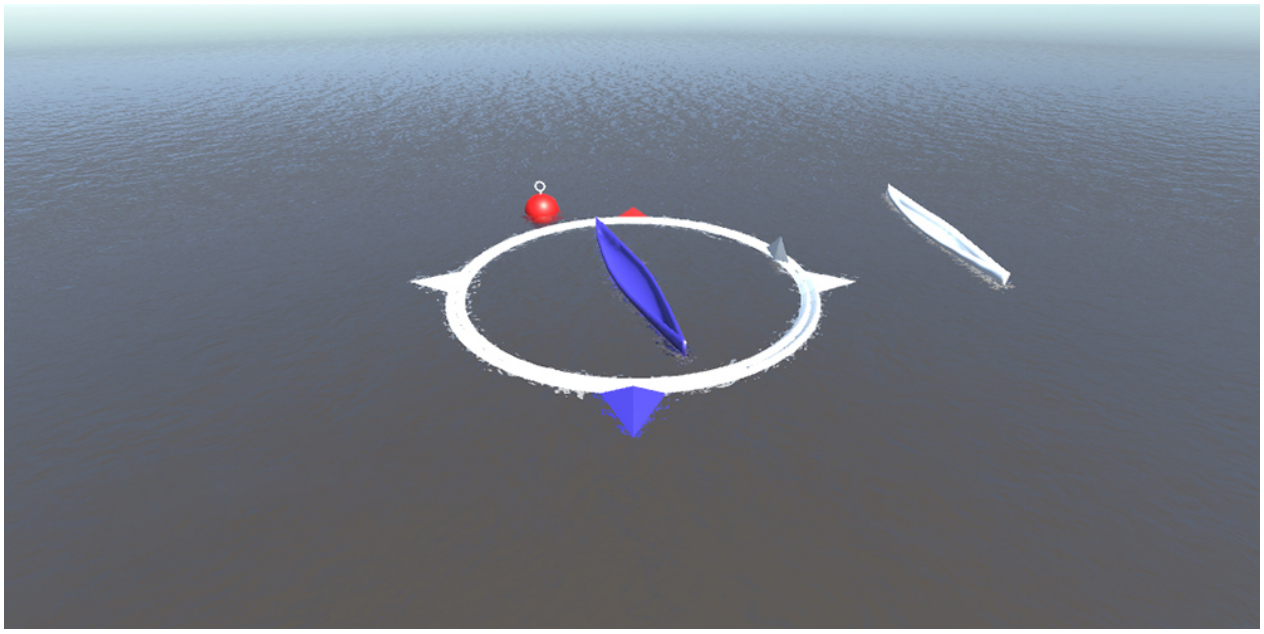
One of the reasons the question of postmodernity in Latin America does not necessarily concern the perception of the end of metanarratives is because of how imperatively projects of modernization ranging from sociotechnical development, literacy and social emancipation have posed themselves. From the nineteenth to twentieth centuries, modernization appeared both as means and objective of the transition from a colonial society to a socially and economically emancipated one. Because of the scale of the investments they required, these projects could not be completely abandoned, nor could they comprehend with stability the distinct hybrid of multi-temporal sociocultural expressions that exist in Latin America.

According to the basic progressive thesis, although colonialism bootstraps the European culture of modernity, it creates the condition for the emancipation of modern Latin American nation-states—that is, for their 'critical' moment in relation to the structures and mechanisms that produced them. This critical moment is simultaneously an expression of autochthony and difference from, and of appropriation and transculturation of enlightenment ideals. What is of concern here, however, are the problems that emerge from the asymmetries that lie on different sides of the trajectory of modernity, because they complicate the legislative, universal power that endows enlightenment ideologies. If the deployment of these ideals in a sociohistorical reality other than that of their emergence enshrines different referents and materials (concretely speaking), do their categorical imperatives remain unshaken?

If the possibility of a negative answer frustrates Western philosophical orthodoxy, it raises further difficulties and opportunities to think about what it means to have a conversation that is not dictated by the "absolute monologue of colonial reason," as Nick Land puts in "Kant, Capital, and the Prohibition of Incest: a Polemical Introduction to the Configuration of Philosophy and Modernity."[3] Land exposes the paradox of the enlightenment in a description of modernity as an "inhibited synthesis," which is consummated in Kant's philosophy: "Kant's 'object' is thus the universal form of the relation to alterity; that which must of necessity be the same in the other in order for it to appear to us. This universal form is that which is necessary for anything to be 'on offer' for experience, it is the 'exchange value' that first allows a thing to be marketed to the

enlightenment mind."[4] In its absolute monological form, the extension and actualization of modernity in Latin America would not be a problem at all, since what is affirmed in this case is precisely the continuity between the ideals that appeal to the enlightenment mind *regardless* of the material referents that determine the locus of instantiation—it is the same modernity all the way down.

If what is emphasized is not the universality but the differences—the dissonant intervals that repel one from another, then we might be able to conceive of the problem in terms other than recognition and reconciliation. The impetus of this approach is akin to the one François Jullien adopts when he speaks of divergences in *On the Universal: the Uniform, the Common and Dialogue Between Cultures,* "But the concept of *divergence* is a rigorous and combative concept in this respect: by leading us to probe *the point to which* divergences could lead, to measure the distance which opens up between them, it unfolds the cultural and the thinkable to their limit."[5] Despite my skepticism toward some profound renewal of the culture of the enlightenment emerging from the encounter between modernity as an European ideal and culture, and Latin American modernity as a transcultured (at times 'postcolonial') instance, I take the exercise of thinking of the possibility of unbinding universalism, colonialism and modernity in the sense outlined by Jullien—that is, as an opportunity to "[p]robe *the point to which* divergences could lead."



UCLA Concrete Canoe, Video Game (ACM, ASCE, Jungsu Pak, Theodore Nuguyen, 2015)

Such a disentanglement would entail suspending the imperative of the universal as informing and regulating the image of what it means to think. As Land acutely anticipated in his text, this demands (among other things) a consequential engagement with anthropology. The inhibited synthesis whose functioning Land uncovers in "Kant, Capital, and the Prohibition of Incest," and relates to Lévi-Strauss's *The Elementary Structures of Kinship* finds a contemporary interlocutor in the "anti-narcissistic" decolonization of thought that Eduardo Viveiros de Castro proposes in the texts gathered as *Cannibal Metaphysics*, where one of the theses advanced is that "[e]very nontrivial anthropological theory is a *version* of an indigenous practice of knowledge."[6] A nontrivial anthropological theory—an "experimental metaphysics," as Viveiros de Castro puts it—comes to enter into a disjunctive synthesis with "philosophy conceived as the *sui generis* ethno-anthropological practice of the creation of concepts" oriented towards the "permanent decolonization of thought."[7] This disjunctive synthesis between anthropology and philosophy would thus be the *possible* point of an uninhibited synthesis between the versions of practices and styles of knowledge that these disciplines study. Equivocation is the challenge that Viveiros de Castro's conception of Amerindian multinaturalism and perspectivism poses for a project of cultural translation, oriented toward the externalization of reason. "Amerindian perspectivism is a doctrine of equivocation, of referential alterity between homonymous concepts. Equivocation is the mode of communication between its different perspectival positions and is thus at once the condition of possibility of the anthropological enterprise and its limit."[8] Drawing from extensive study of Amerindian collectives, Viveiros de Castro presents, under the name 'multinaturalism,' a perspectivist metaphysics which undermines the political exigencies of the universal; equivocation effectively posits the universal as a case of mistaken identity; a mutual stabilization of reciprocal apperceptions is represented as the 'same' object. Equivocation is fragile, unsuitable from grounding compromises with the weight of the past.

Read as a narrative of possible reconciliation, Guimarães Rosa's "Third Bank" seems to present a scenario that corroborates modern progression: traditional life in the interior of Brazil is dissolved, the family is ruptured, the mother and sister move to a city, a brother to another, while a third son stays and maintains his tie with the father, who shows no signs of leaving the third bank of the river. Here, perhaps, we would be tempted to read the father as having lost touch with actuality; the son also asks if he has not gone mad, as someone who remains stuck in his archaic ways despite modernity's transformations. But the third bank of the river can also be read as a manifestation of

irreconcilable convergences, as a place that is determined neither by vital needs nor by stagnation. “Doesn’t the father ever get sick?” asks the son. “And the constant strength of the arms, to have a hold on the canoe, resisting, even in the excess of floods, at the high water, there when everything dangerous flows with the enormous thrust, those bodies of dead animals and tree branches coming down—of fright, crashing.”[9] The story does not capitulate to the literary determinations of either realism (doesn’t the father ever get sick?) or myth (as realm or discourse ‘outside’ history); nor does it reconcile languages expressive of modernity with a colonial past. To a great extent this is due to the seemingly trivial, but also profound, fact that the narrative is a literary and philosophical artifact of a supposedly ‘unintelligible’ event.

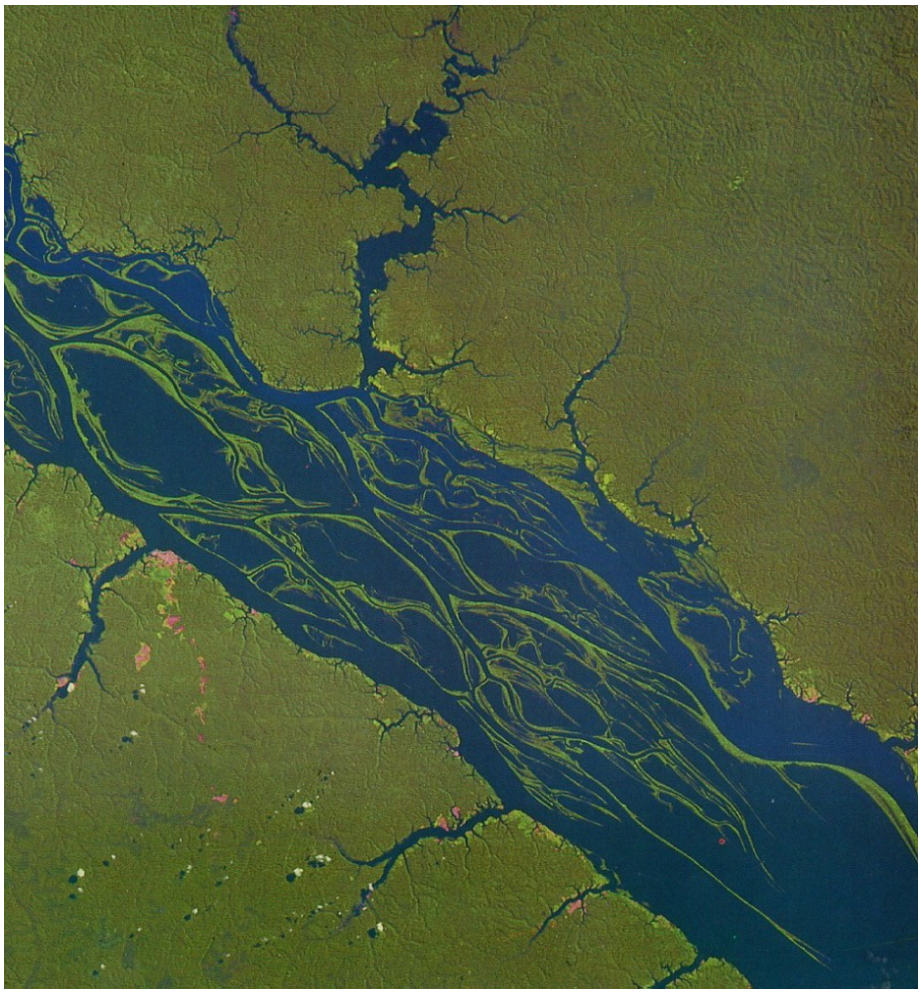
In this sense, Sevcenko’s reading of the story is revealing precisely where it insists on an interpretation of the narrative as determined by history: “Written at the beginning of the 1960s, it reflects the cultural climate of the time marked by a catalyzing event, which mobilized the creative energies of the country: the foundation of its new capital, the planned city of Brasília.”[10] The site of construction of Brasília is at once a ‘nowhere’ and a ‘location’ *par excellence*: far from the coastal regions as metropolitan loci; the product of a deliberate gesture of centralization and geometrization of space. Sevcenko’s Brasília encapsulates this configuration:

> *The Capital of Hope, as it was called, would be, at one and the same time, the origin of the “cosmic race” as conceived by one of the influential figures behind Mexican muralists, José Vasconcelos, and the centre which heralded the “third way”—the society resulting from the emancipation of colonial peoples from their past, as well as from the imperialist pretensions of powers locked into the Cold War. Brasília would be the “third bank,” the bridge between an undesirable past and a still impalpable future, the materialisation of the impossible.*[11]

Sevcenko’s framing of Brasília as a “third bank” is symptomatic of the proliferation of visions in Latin America, where Brasília is, in the words of José Miguel Wisnik, “mirage of modern Brazil and modern Brazil as mirage.”[12] Brasília embodies the double modern impulse towards the ceaseless rejection of previous foundations—such as the old capital, Rio de Janeiro—and the insistent establishment of a new edifice, marking the supposed passage into the modern era.

In the face of his father’s decision to take his canoe to the middle of the river, the narrator-son, in Sevcenko’s words, “[h]esitates and reflects with the reader on the significance of this act, of his father’s invention of an impossible place, which does not exist, and asks if the reader would undertake to enter this place, becoming paralyzed like

the father in a permanent mobility, enclosed in the continuous flow of atemporality."[13] What Sevcenko assumes as a given is the status of the third bank of the river as an impossible place, which could as well be understood by reversing the direction, so that the third bank becomes the locus where *place* becomes an infinite problem. As Deleuze puts it in *The Logic of Sense*, "Sense is always a double sense and excludes the possibility that there may be a 'good sense' in the relation."[14] To take this reversal further, the third bank of the river allows the perception of "permanent mobility" and the "continuous flow of atemporality" to meet their Möbius-like inside-outs: *impermanent stasis* (or immobile transience) and *discontinuous damming of temporality.* If we see the third bank of the river as the (non)locus where all these visions meet and multiply, the framing of the text as standing for a relatively conventional narrative of modernity in Latin America must be displaced by one that explores the paradox of the third bank. Is the boat paralyzed in a permanent mobility or is it floating through an impermanent stasis? The point is not to choose either, but to arrive at the point at which both can be placed in communication. Guimarães Rosa stages the gestures that lead to conception of the third bank of the river as a place for a 'horotic'[15] meditation. The supposedly unthinkable act of staying at the margin of the margin thus founds both the communication between 'oppositional' flows of sense, and a contemplation of the margin itself, otherwise impossible from 'either' side of the river.



Rio Negro, NASA Modis Satellite (2008)

The ending of the story brings to the fore the multiple directions that aggregate at the third bank in a language that does not yield easy referents. After failing to take his father's place on the canoe, the narrator-son says, "*Sou o que não foi, o que vai ficar calado*"[16] – "I am what was not, what will remain silent." By not taking his father's canoe at the third bank of the river he breaks what would be a linear patrilineal genealogy, establishing another one by connecting with a temporality that "was not." Notice the impersonal aspect of this temporality in the third person preterit '*foi,*' instead of the first person '*fui.*' This impersonal temporal trajectory leads the narrator-son to think that in death he might *at last* be on the canoe. "*Mas, então, ao menos, que, no artigo da morte, peguem em mim, e me depositem também numa canoinha de nada, nessa água, que não pára, de longas beiras: e, eu, rio abaixo, rio a fora, rio a dentro—o rio.*"[17] "But then, unless that in the fact of death they take me, and place me too in any little canoe, in this water that doesn't stop, of long margins, and I, downriver, out the river, into the river—the river." In virtue of being the locus of convergence between impersonal temporalities—"*o que não*

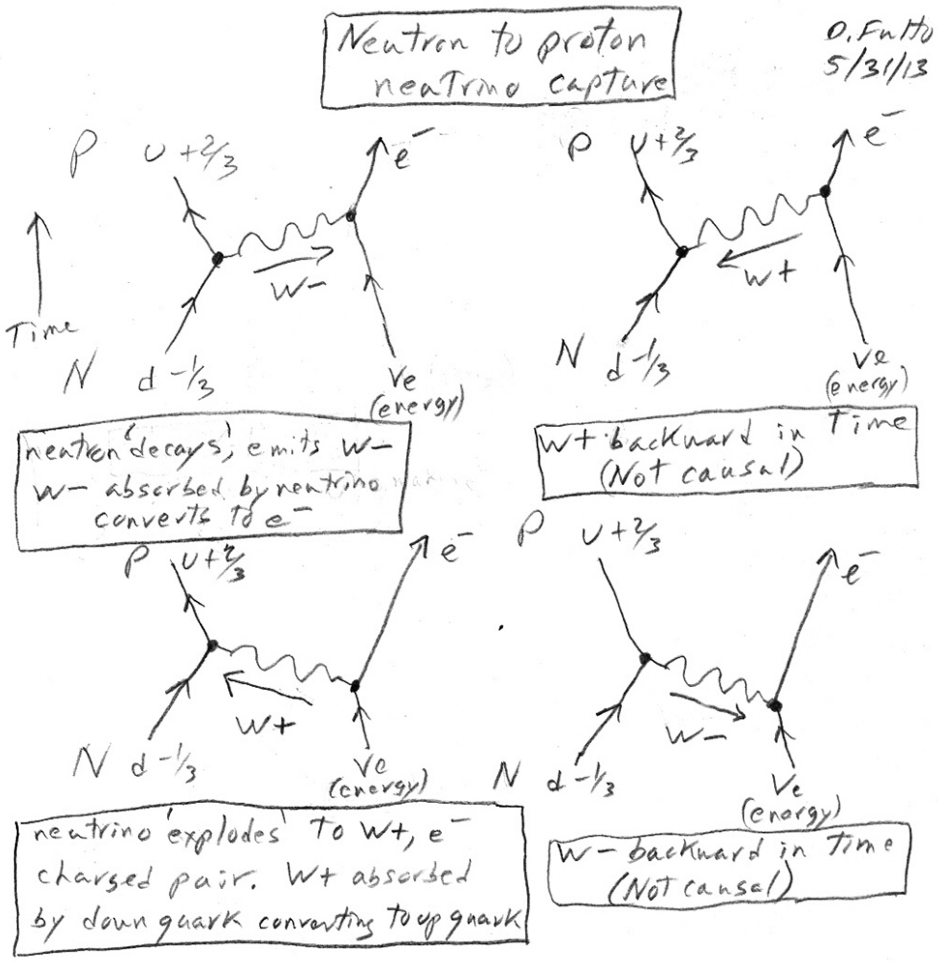
foi" and "*o que vai ficar calado*"—a past that did not come to be and a future that will remain silent, the narrator-son's intention of taking the canoe after his death is not productive of an imaginary; the discontinuity of the father-canoe-son series prevents its circumscription within the temporal scope of modernity. The canoe bifurcates destinies and functions as a singularization of fate from the point of view of the father and of the son, and this effectively breaks the linear genealogy and identity[18] of the canoe. The father effectively stays in the canoe in life; the son potentially embarks on the canoe in death.

The conceptual theme of the margin, iconic and paradigmatic in the intellectual traditions of thought on modernity in Latin America, is retrieved and conceptualized with a new force by Fernando Zalamea in *América una trama integral—Transversalidad, bordes y abismos en la cultura americana, siglos XIX y XX*. As a margin of Western traditions, Latin America is "[*l*]*ugar de fronteras y de tránsitos*,"[19] a place of frontiers and transits, in geographic and historical terms.

> *E*xtremidad, límite o espacio en blanco, el margen representa, física y simbólicamente, aquello que queda de lado, alejado de un conjetural centro. Sin género y sin lugar, el margen es, sin embargo, precisamente gracias a su indefinición y su genericidad, un concepto de una extraordinaria riqueza y ductilidad para poder ver más ampliamente el mundo *[…]*.[20]
> *Extremity, limit or blank space, the margin physically and symbolically represents that which stays on the side, away from a conjectural center. Without kind and place, the margin nevertheless is, precisely because of its indefinition and genericity, a concept of extreme ductility to more amply see the world […].*[21]

Following Zalamea's conception of the architecture and topos of Latin American culture, the distances between the 'panoptic,' synthetic vision of Latin America as margin in the microscopic instance of Brasília, are traversed by a *telescopic*, transversal movement: "*Una propiedad telescópica de la cultura entra entonces en juego, cuando los más diversos fragmentos de la cultura se reflejan unos en otros—agrandando las imágenes de objetos lejanos.*"[22] "A telescopic property of culture is thus in play when the most diverse fragments of culture are reflected in each other—enlarging the images of distant objects."[23] Zalamea's 'semiotic' conception of Latin America as margin of the West, culturally and geographically, accounts for the transits of information and perspectives that are generated by its intellectual currents. This semiotic and topological approach thus shifts the focus of the discussion away from the supervision of conceptual purity under universal imperatives to one on techniques and modes of communication, transit

of information, and the transformation of the concept. As Zalamea puts it in "Peirce and Latin American 'Razonabilidad': Forerunners of Transmodernity": "[B]oth Peirce's system and Latin American TRANS culture help to reinterpret universals as partial invariants of a logic of change, where the *borders of reason and sensibility* appear as objects of reason on their own right."[24] The reinterpretation of universals as "partial invariants of a logic of change" is itself a shift that occurs through a transmodern[25] movement that cuts across modernity and postmodernity, and as such is not spatiotemporally circumscribable by either. In *América,* Zalamea sees "The pertinence of transmodernity as consisting of its possibility of registering accelerations and decelerations (García Canclini, Martín-Barbero), connections, superpositions, and links [...]."[26]



Four Feynman diagrams (Donald E. Fulton, 2015)

Alongside these possibilities, telescopy and translation, traversal and equivocation are valuable semiotic and transcultural techniques of communication and transformation between styles of epistemic practices. When it crosses the margin, a place of transit and

flow, knowledge emerges as 'material,' or 'information,' rather than an 'effect' of conceptual purity. Viveiros de Castro's proposal of translation also approaches the goal of an uninhibited philosophy: "Good translation succeeds at allowing foreign concepts to deform and subvert the conceptual apparatus of the translator such that the *intention* of the original language can be expressed through and thus transform that of the destination. *Translation, betrayal...transformation.*"[27] In this sense, reconciliation designates both an undesirable and unviable means and objective of encounters between languages and cultures, styles of epistemic practices, and distinct temporal series.
On the theme of betrayal, perhaps one of the most pertinent instances of the tipping of positions between alliance and enmity is Werner Herzog's film *Fitzcarraldo*, where Fitzcarraldo's modernist dream of an opera house in the confines of the Amazon forest leads him to take up a role in the rubber economy as to acquire a ship to reach the construction site. Taking Fitzcarraldo for some kind of god, a potentially hostile indigenous tribe helps him move his ship over the mountain so as to avoid a dangerous passage, only to seize control of the ship for their own purposes. Guimarães Rosa's "The Third Bank of the River" and Herzog's *Fitzcarraldo* suggest that at the limit of the controlled navigation of the canoe or the boat lies the current of the river, itself a gripping border between reason and sensibility. The former is a study of the third bank as impossible place, and locus where place becomes an infinite problem. The father studies the dissonant simultaneity between a *continuous flow of atemporality* and an *impermanent stasis*. It is from the perspective of the son, anchored outside the river and in charge of the telling of the story (narrative), that this task is presented as 'unintelligible,' which is all the more reason to undertake it. The immobile transience of the father's canoe contrasts with the crash of Fitzcarraldo's abducted ship, plotted by the indigenous people to appease the spirit of the rapids—that is, to reestablish balance in the flow of the river. Perhaps the latter can be seen as a daring, albeit fictional, exercise in a non-Western style of cybernetics in its many senses and transdisciplinary forms.

Footnotes

1. Nicolau Sevcenko. "Peregrinations, Visions and the City: From Canudos to Brasília, the Backlands become the City and the City becomes the Backlands." *Through the Kaleidoscope: The Experience of Modernity in Latin America*. Ed. Vivian Schelling. London: Verso, 2000. 100. Print.

2. John Beverley, Michael Aronna, and José Oviedo, eds. *The Postmodernism Debate in Latin America*. Durham: Duke UP, 1995. 4. Print.

3. Robin Mackay and Ray Brassier, eds. *Fanged Noumena: Collected Writings 1987-2007*. Falmouth: Urbanomic, 2011. 74. Print.

4. *Ibid.* 67.

5. François Jullien. *On the Universal the Uniform, the Common and Dialogue between Cultures*. Cambridge: Polity, 2014. 152. Print.

6. Eduardo Batalha Viveiros de Castro. *Cannibal Metaphysics: For a Post-Structural Anthropology*. Trans. Peter Skafish. Minneapolis: Univocal, 2014. 42. Print.

7. *Ibid.* 91-92.

8. *Ibid.* 87.

9. João Guimarães Rosa. *Primeiras Estórias*. 5th ed. Rio de Janeiro: Livraria José Olympio, 1969. 35. Print. Although *Primeiras Estórias* has been translated into English, the passages cited here are my own translations, and are informed both by the theories discussed here and by divergences from the existing translation. See *The Third Bank of the River and Other Stories*. Trans. Barbara Shelby. New York: Alfred A. Knopf, 1968. Print.

10. Sevcenko. 101.

11. *Ibid.* 101-102.

12. José Miguel Wisnik. *Sem Receita: Ensaios E Canções*. São Paulo, SP: Publifolha, 2004. 124. Print.

13. Sevcenko. 101.

14. Gilles Deleuze. *The Logic of Sense*. New York: Columbia UP, 1990. 34. Print.

15. Proposed by Giovanni Maddalena and Fernando Zalamea, *horotics* "[p]retends to open the way to general forms of reasoning beyond the polarity analysis/synthesis." "A New Analytic/Synthetic/Horotic Paradigm. From Mathematical Gesture to Synthetic/Horotic Reasoning." *European Journal of Pragmatism and American Philosophy* VI:2 (2012): 212. Web.

16. Guimarães Rosa. 37.

17. *Ibid.* 37

18. As Maddalena and Zalamea put it, "A *horotic* judgment (from *horos*, border) is a judgment that is blind to identity through changes." "A New Analytic/Synthetic/Horotic Paradigm. From Mathematical Gesture to Synthetic/Horotic Reasoning." 210. Web.

19. Fernando Zalamea. *América—Una Trama Integral: Transversalidad, Bordes y Abismos en la Cultura Americana*. Bogota: Universidad Nacional de Colombia, 2009. 197. Print.

20. *Ibid.* 198.

21. My translation.

22. *Ibid.* 205.

23. My translation.

24. "Peirce and Latin American 'Razonabilidad': Forerunners of Transmodernity." *European Journal of Pragmatism and American Philosophy* I:1 (2009): 1. Web.

25. *Ibid.* 1. Zalamea describes Rosa María Rodríguez Magda's transmodernity as both a "diachronic and methodological" term.

26. My translation. 274.

27. Viveiros de Castro. 87.

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The Theory of Topos-Theoretic ‘Bridges’—A Conceptual Introduction

Olivia Caramello

Introduction

Mathematics is divided into several distinct areas: geometry, number theory, algebra, analysis, mathematical logic, and so on. Each of these areas has evolved throughout the years by developing its own ideas and techniques, and by now has reached a remarkable degree of specialization. Now, even more than in the past, we feel the need to unify theories that could intra-disciplinarily connect different areas of mathematics with their different sets of concepts, objects, and methods, in new and powerful ways, hence providing effective tools for solving long-standing problems. It has happened several times that solutions to profound problems in one field have first, or only, been obtained by using methods from other fields, and this indicates that Mathematics should be seen as a coherent whole rather than a collection of separate fields. Think for example of analytic geometry, which allows the study of geometrical shapes using algebraic manipulation, or the Grothendieckian notion of spectra, which allows the study of discrete objects using a geometric continuous intuition.

The importance of ‘bridges’ between different areas lies in the fact that they make it possible to transfer knowledge and methods between the areas, so that problems formulated in the language of one field can be tackled (and possibly solved) using techniques from a different field, and results in one area can be appropriately transferred to results in another.

A few years ago, I had the intuition that the theory of Grothendieck toposes could provide a powerful means for unifying different mathematical theories. More precisely, I imagined that the possibility of representing toposes in multiple ways could be exploited for building 'bridges' interconnecting different theories and allowing a transfer of information between them.

Toposes are abstract logical concepts that lie at a level of generality which is ideal for shedding light on Mathematics as a whole. To any mathematical theory of a very general nature (algebraic, geometrical, etc.) one can associate a topos, called the classifying topos of the theory, which embodies its essential features (i.e., precisely those features which are invariant under a general notion of theoretical equivalence). This enables us to study theories by studying their classifying toposes. Different theories may be classified by the same topos; this means precisely that they describe the same structures in different languages. The existence of different theories classified by the same topos translates, at the technical level, into the existence of multiple representations for that topos. The latter can then be used as a 'bridge' for transferring properties, notions and results across those theories.

Throughout the past years, I have developed a set of intra-disciplinary methods and techniques for effectively using toposes as unifying 'bridges,' and, in doing this, I have uncovered a number of connections between different mathematical theories that were previously hidden and, in many cases, even unsuspected. Initially, in 2010, my view was supported by the results obtained in my Ph.D. dissertation. My subsequent work brought new evidence every year, some of which provided the solution to long-standing problems. By now a substantial body of mathematical results has been produced: this includes a number of deep applications into distinct fields such as Algebra, Geometry, Topology, Functional Analysis, Model Theory, and Proof Theory.

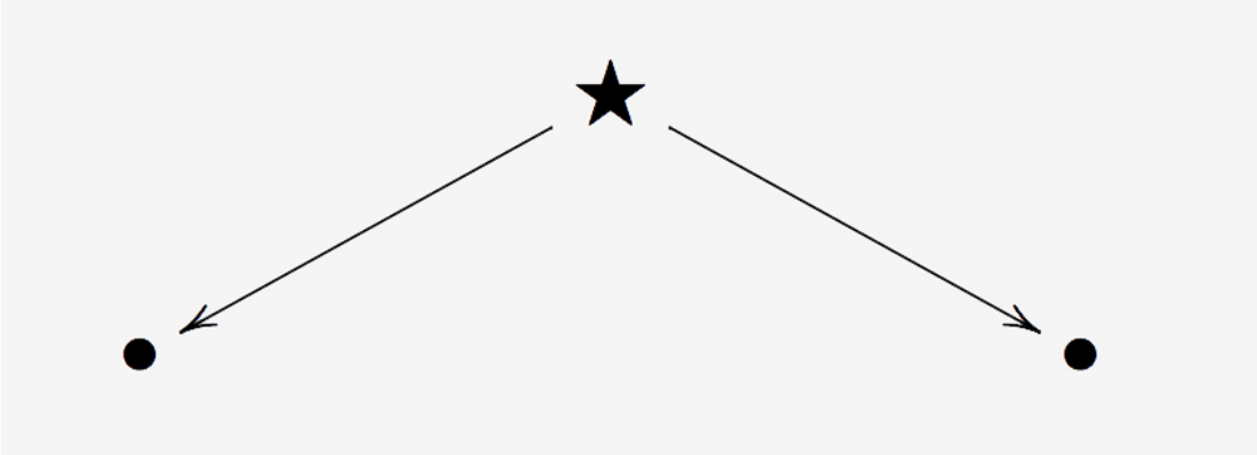
The purpose of this article is to give a conceptual introduction, accessible to non-specialists, to the theory of topos-theoretic 'bridges.'[1] The last section of the paper is more technical and requires a basic familiarity with logic and category theory to be properly understood.[2]

The Concept of Unification

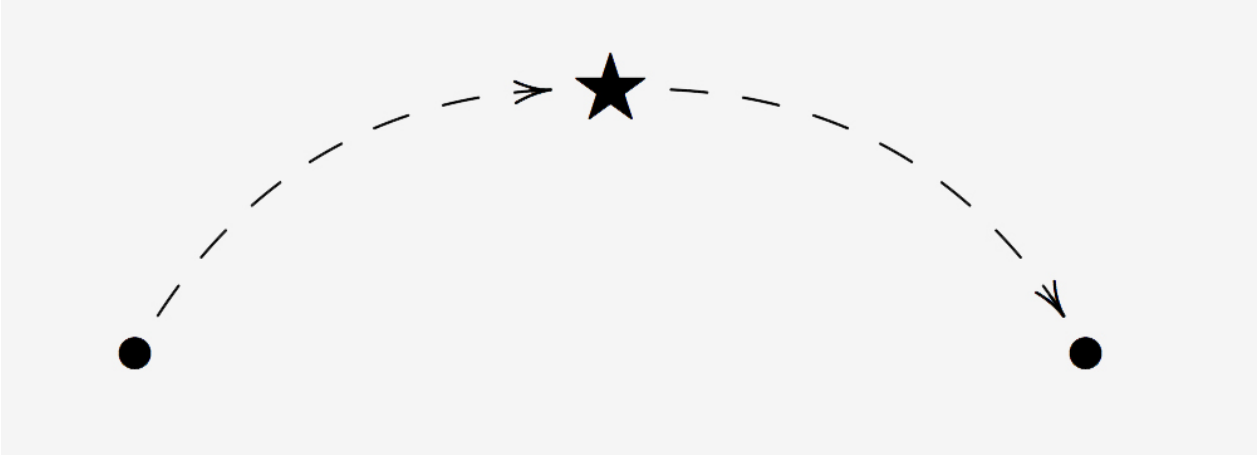
Before we proceed any further, let us first clarify the term 'unification,' as it is somewhat ambiguous and can be used with different meanings.

'Static' and 'Dynamic' Unification

We can distinguish two different kinds of unification: 'static' and 'dynamic.'
. With 'static' unification (through *generalization*), two concepts are seen to be special instances of a more general concept:



Results that apply to the general concept may be *specialized* to yield results on the two more particular concepts.
. With 'dynamic' unification (through *construction*), on the other hand, two objects are related to each other through a third one (usually constructed from each of them), which acts as a 'bridge' enabling the transfer of information between them:



The transfer of information arises from the process of 'translating' properties (or constructions) on the 'bridge object' into properties (or constructions) on the two objects.
We call the first form of unification 'static' in light of the fact that recognizing two different concepts as particular cases of a more general one does not in and of itself offer a way for transferring information between them. For example, the fact that both

preorders and groups are particular instances of the general notion of category does not in and of itself provide a means of transferring results about preorders to results about groups, or vice versa.

On the other hand, the second form of unification allows a 'dynamic' transfer of information between the two given objects. Indeed, the third object which is associated or constructed from each of the two objects admits two different 'representations,' corresponding to the two different ways of constructing it from each of the two objects. Such an object thus yields 'bridges' between the two given objects in the sense that information can be transferred between them by translating properties of (or constructions on) the bridge object into properties of (or constructions on) the two objects, by exploiting its two different representations.

Let us illustrate the difference between these two kinds of unification using some notable mathematical examples.

By providing a system in which all the usual mathematical concepts can be expressed rigorously, Set Theory represented the first serious attempt of Logic to unify Mathematics, at least at the level of language. Later, Category Theory provided an alternative abstract language in which most of Mathematics can be formulated and, as such, has represented a further advancement towards the goal of 'unifying Mathematics.' Anyway, both of these systems realize a 'static' unification in that, whilst each of them provides a way of expressing and organizing Mathematics in one single language, they do not in and of themselves offer effective methods for an actual transfer of knowledge between distinct fields.

On the other hand, the theory of topos-theoretic 'bridges' provides a systematic way to compare distinct mathematical theories with each other and to transfer knowledge between them. In this setting, the two objects to be related to each other are distinct mathematical theories which share a common 'semantic core,' while the bridge object is a Grothendieck topos representing precisely this common 'core.'

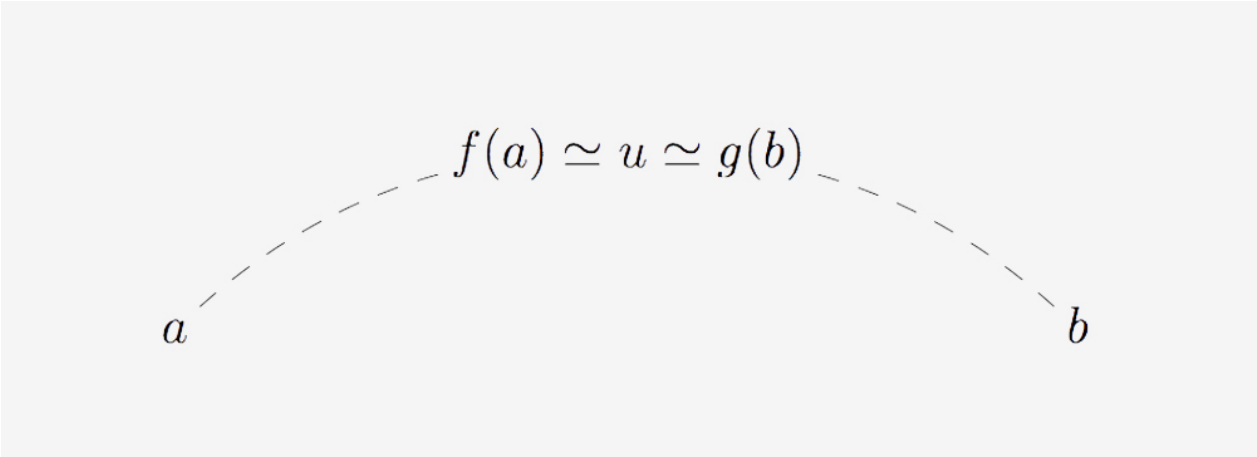
As a given 'bridge object' can generally interconnect not just two objects but many different pairs of objects, so in the topos-theoretic setting, for each topos there exist infinitely many different mathematical theories associated with it (through the classifying topos construction).

Other instances of dynamic unification certainly occur in Mathematics; in fact, invariants are always sources of 'bridges' between objects on which they are defined. So, for example, the fundamental group of a topological space can be used as a bridge for transferring information between topological spaces, in the sense that if two topological

spaces have isomorphic fundamental groups, then certain topological properties, such as simple connectedness, can be transferred across the spaces. Similarly, groups can be used to classify geometries, as in Klein's Erlangen Program, etc.
The startling aspect of toposes is that, unlike most of the invariants considered in Mathematics, they allow us to compare and effectively interconnect mathematical theories that may belong to several different subfields of Mathematics.

The Idea of 'Bridge'

One is generally interested in comparing pairs of objects between which there is some kind of relationship.
In order to transfer information between objects related by a given relationship, it is thus of fundamental importance to identify (and, possibly, classify) the properties of the objects that are *invariant* with respect to that relationship.
Depending on the cases, this can be a reasonably manageable task or a hopelessly difficult one. In fact, a relationship between two given objects is generally an abstract entity, which lives in an ideal context that is normally different from that in which the two objects lie.
It thus becomes of crucial importance to identify more *concrete* entities that could act as 'bridges' connecting the two given objects. We can think of a *bridge object* connecting two objects *a* and *b* as an object u which can be 'built' from any of the two objects *a* and *b*, and which admits two different representations *f(a)* and *g(b)* related by some kind of equivalence $\simeq$, the former representation being in terms of the object *a* and the latter in terms of the object *b*:



The transfers of information arise from the process of 'translating' $\simeq$- invariant properties of (or constructions on) the 'bridge object' u into properties of (or constructions on) the two objects a and b by using the two different representations of u. Notice that the invariance with respect to $\simeq$ is essential in order to be able to regard the given property of (or construction on) u both from the point of view of a, by using f, and from the point of view of b, by using g. Of course, such a 'bridge' is more or less useful depending on whether the 'encodings' f and g are sufficiently well-behaved to allow genuine 'unravellings' of the given property of (or construction on) $f(a)$ (or $g[b]$) in terms of properties of (or constructions on) a (respective of b).

The idea of 'bridge' is strictly related to that of 'invariant construction.' Given two sets I and O, and two equivalence relations $\simeq I$ and $\simeq O$ respectively on I and on O, we may define an invariant construction $f: (I, \simeq I) \to (O, \simeq O)$ is a function $f: I \to O$ which respects the equivalence relations (i.e., such that whenever $x \simeq I\, y$, $f[x] \simeq O\, f[y]$). We say that f is conservative if it reflects the equivalence relations (i.e., whenever $f[x] \simeq O\, f[y]$, $x \simeq I\, y$). Given an invariant construction $f: (I, \simeq I) \to (O, \simeq O)$, a bridge object connecting two objects $x, y \in I$ is an object $b \in O$ such that $b \simeq O\, f(x)$ and $b \simeq O\, f(y)$. Given a conservative invariant construction $f: (I, \simeq I) \to (O, \simeq O)$, bridge objects in O, considered up to $\simeq O$-equivalence, can be thought of as classifying objects, since they can be taken as canonical representatives of $\simeq I$-equivalence classes.

Of course, a 'bridge' of this kind is most useful in classifying $\simeq I$-invariant properties in cases in which it is more manageable to work with objects of type O than with objects of type I, or when the relation $\simeq O$ is more tractable than the relation $\simeq I$.

As we shall see in section IV, in the context of the theory of topos-theoretic 'bridges' the objects to be compared with each other are mathematical theories (formalized within a kind of first-order logic), while the invariant construction is given by the classifying topos construction.

Structural Translations

The bridge method can be interpreted linguistically as a methodology for *translating concepts* from one context to another. But which kind of translation is this? Generally speaking, we distinguish between two essentially different approaches to translation:

1) the *'dictionary-oriented'* or 'bottom-up' approach, consisting in a dictionary-based renaming of the single words composing the sentences, and
2) the *'invariant-oriented'* or 'top-down' approach, consisting in the identification of appropriate concepts that should remain invariant in the translation, and in the subsequent analysis of how these invariants can be expressed in the two languages.
As would be expected, translations of the former kind, though occasionally useful, are not intrinsically profound in that they do not change the 'shape' of the sentences on which they operate and hence do not provide significantly different ways for conveying a certain message. On the other hand, the invariant-oriented translations are liable to significantly change the syntactical form used to express a certain meaning, and thus to generate new insights and points of view on the given message. We shall come back to this topic in section III.B.
Translations across distinct mathematical theories realized through *bi-interpretations* between them are of the former kind. Indeed, bi-interpretation acts as a sort of dictionary for translating formulae written in the language of the first theory into formulae written in the language of the second. On the other hand, 'bridge-based' translations, and in particular topos-theoretic ones, are of the latter kind. In fact, in the context of the theory of topos-theoretic 'bridges,' the invariant properties are topos-theoretic invariants defined on toposes, and the expression of these invariants in terms of the two different theories is essentially determined by the *structural relationship* between the topos and its two different representations.

Some Examples of 'Bridges' in Science

In order to illustrate the concept of the 'bridge' as explained above, let us discuss a few scientific situations that can be naturally interpreted in terms of 'bridges.'

Astronomy: The 'Classifying Star' of a Planet

The universe is composed of several stars, around which revolve certain bodies, called planets. Different planets can revolve around a given star, but every planet revolves around a single star, which we call the planet's *classifying star*.
The trajectory that a given planet makes around its classifying star is determined by two sets of ingredients, namely the parameters determining the ellipse and the period of revolution around its classifying star. This pair (ellipse parameters and period of revolution) for a given planet determines its orbit and its classifying star. The classifying star can be identified uniquely from any planet that is classified by it (equivalently, from

the pair associated with it), and represents the 'right' point of view from which one should observe it (in fact, the elliptic motion of a planet looks very weird if observed from any other point of view than one of its foci).
Different planets revolving around the same star can be studied in relation to each other using properties of the common classifying star, which therefore acts as a 'bridge object' across them. In fact, there are natural relationships between properties of planets and properties of the stars around which they revolve.
To have an idea of the use of 'bridges' in Astronomy, think for example of Kepler's laws. The property that all the planets revolving around a given star have elliptic orbits can be regarded as an invariant property of stars (or, more generally, of bodies around which other bodies revolve). The concrete orbit of a given planet can be seen as arising from the process of expressing this abstract invariant 'the orbits are elliptic' in terms of the concrete pair associated with the given planet. So the forms of the orbits of two distinct planets around the same star represent different instances of a unique abstract pattern. Also, it is often the case that by investigating the features of a given planet, one can infer properties of its classifying star, and that these properties can in turn be 'reflected back' into properties of another planet revolving around the same star. For example, the third Kepler's law asserts that the ratio of the square of the orbital period of a planet by the cube of the semi-major axis of its orbit is a constant that is characteristic of the star and does not depend on the given planet. This principle can thus be regarded as an invariant property of stars (or, more generally, of bodies around which other bodies revolve), and the concrete trajectories made by the planets can be interpreted as different manifestations of this abstract property in the context of the distinct (pairs associated with the) planets. The common classifying star can thus be used as a 'bridge' to transfer information between the two planets; indeed, investigation of the concrete trajectory of a planet can allow one to infer the characteristic constant of its classifying star, and this piece of information in turn determines the concrete trajectory of any other planet revolving around it.

Linguistics: 'Bridges' for Translating

A fundamental feature of a translation is the set of abstract properties of texts (for example, the 'meaning,' the 'musicality,' 'structural' characteristics, etc.) which it leaves *invariant*.

A literal translation proceeds in a bottom-up or dictionary-oriented way, as it consists, broadly speaking, in splitting the given text into sentences and then into words or short expressions, replacing each word (or short expression) in the first language with a word (or short expression) in the other language that corresponds to it according to a given dictionary, and then assembling these words together 'from the bottom up,' following the same or at most a similar grammatical structure to that in which the corresponding words (or short expressions) were arranged in the original text. From this description, it is clear that what is preserved by this kind of translation is the syntactical structure of the sentences that make up the texts, but not necessarily the meaning or musicality of the texts, which is what one would naturally expect from a good translation. This is why automatic or literal translations are not always possible, and even when they are, are often rather unsatisfactory, especially when they occur between languages that have radically different syntactical ways of expressing a given meaning.

This naturally raises the following question: what type of approach should one adopt to obtain a good translation? Unlike a literal translation, a good translation should proceed in a top-down or invariant-oriented way, starting with the identification of a set of abstract properties of texts that one would like to preserve in the translation, and then using any such property P (or the 'intersection' of all such properties) as a 'bridge' for translating between the two languages, as follows. For each such P one looks at the way P is best expressed in the first language, and then at the way P can be best conveyed in the second language; the resulting expressions are then set to correspond to each other in the translation.

Note that in a translation of this kind, it is not necessarily the syntactical structure that must be preserved, as in the case of a literal translation, but rather the properties defined at the beginning as the chosen invariants. While a literal translation is neither particularly interesting nor conceptually profound, in that it essentially consists in a re-naming or re-labeling of the primitive constituents of a text according to a dictionary, a good literary translation is often a work of art which may reveal new aspects of a text that were, in a sense, 'hidden' in the original version, allowing new and different interpretations of the message.

Genetics: DNA as a 'Bridge'

(Human) DNA embodies many of the essential features of the individual to which it belongs, but is invariant with respect to contingent features of the individual, such as its particular physical appearance at a given time (or its age).

DNA is determined essentially solely by the individual but it can be extracted from him/her in many different ways (for example, from different parts of the body). Many specific features of individuals are reflected in particular features of their DNA.
This makes the DNA a particularly suitable object for acting as a ‘bridge’ for transferring information across different individuals. For instance, the discovery of similarities between the DNA of different individuals may reveal parental relationships between them or similar predispositions to certain diseases.
Notice that the kind of insight that the investigation of DNA can provide cannot be obtained with alternative methods: indeed, only by using this level of analysis can one unveil the ‘hidden’ features of individuals encoded within the DNA.
This is similar to what happens in Topos Theory: the notion of a classifying topos of a theory plays the role of a sort of DNA of the theory, the investigation of which can reveal aspects of the theory that are barely visible with other techniques. As in Genetics one studies how modifications of the DNA influence the characteristics of an individual, so in Topos Theory one can study the effect that topos-theoretic operations on toposes have on the theories classified by them.

Ideal = Real?

Bridges abound both in Mathematics and in other scientific fields, and can be considered ‘responsible’ (at least abstractly) for the ‘genesis’ of things and the nature of reality as we perceive it. The idea of the bridge is an abstraction, but, interestingly, bridges arising in the experimental sciences can often be identified with actual physical objects. In fact, the most enlightening situations occur when these *ideal* objects admit *concrete* representations, allowing us to contemplate the dynamics of ‘differentiation from the unity’ in all its aspects.
Grothendieck toposes allow us to *materialize* a tremendous number of ideal objects, and hence to establish effective bridges between a great variety of different contexts. In general, looking for ‘concrete’ representations of ‘imaginary concepts’ can lead to the discovery of more ‘symmetric’ environments in which phenomena can be described in natural and unified ways.

Toposes as ‘Bridges’

Now that we have extracted the essential conceptual features of the ‘bridge’ technique, we can proceed to illustrating its implementation in the context of topos theory.

The General Methodology

The theory of topos-theoretic 'bridges' is centered around the concept of Grothendieck topos.[3] The theory of Grothendieck topos is written in categorical language, but, unlike Category Theory, it is much more expressive, due to an additional degree of freedom implicit in the definition of topos. Indeed, a category can be thought of as a pair of sets related by some structure satisfying certain properties; any set can be regarded as a category, but most of the categories arising in Mathematics are not of this form. In fact, the concept of category has, with respect to the notion of set, an additional degree of freedom.

Toposes are mathematical objects which are built from a pair, called a site, consisting of a category C and a generalized notion of covering J on it in a certain canonical way (called Grothendieck topology). The process that produces a topos from a given site can be described as a sort of 'completion' with respect to certain categorical operations relative to which the category C might not be closed. Formally, a topos is defined as a category $Sh(C, J)$ of sheaves on a site (C, J).

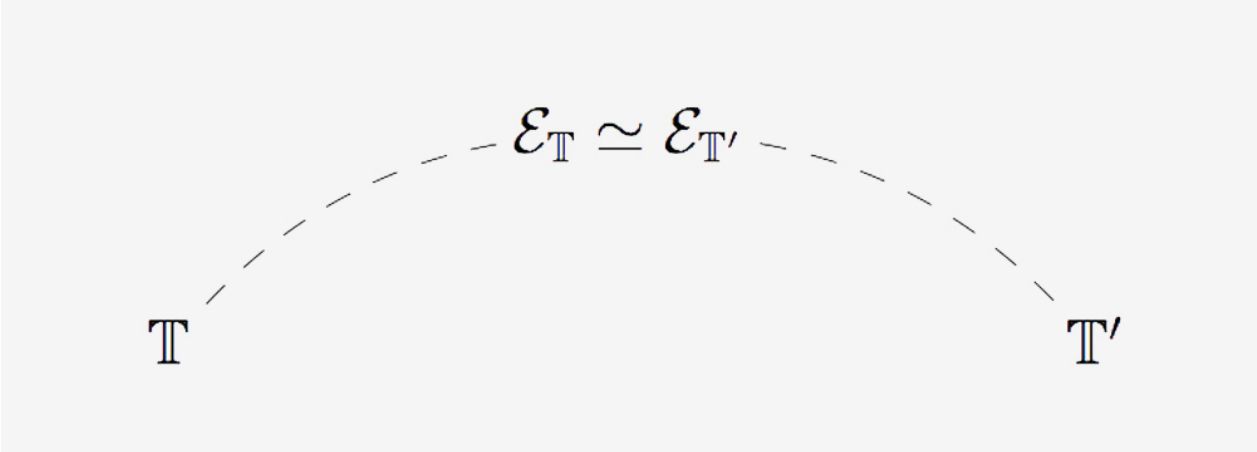
Different coverings can be considered on a given category, generally leading to inequivalent toposes; this gives the notion of topos one more degree of freedom with respect to that of category. The existence of these three 'degrees of freedom' implicit in the concept of a topos (two for the notion of category and one for that of Grothendieck topology) can be exploited to build 'mathematical universes' in which mathematical theories find their natural home and can be effectively compared with each other.

In fact, thanks to the pioneering work of Makkai and Reyes in the seventies,[4] to any mathematical theory T (of a general specified form, technically speaking a *geometric theory*) one can canonically associate a topos ET, called the *classifying topos* of T, which represents the natural framework in which the theory should be investigated, both in itself and in relationship to other theories. Two theories having the same classifying toposes (up to equivalence) are said to be *Morita-equivalent*.

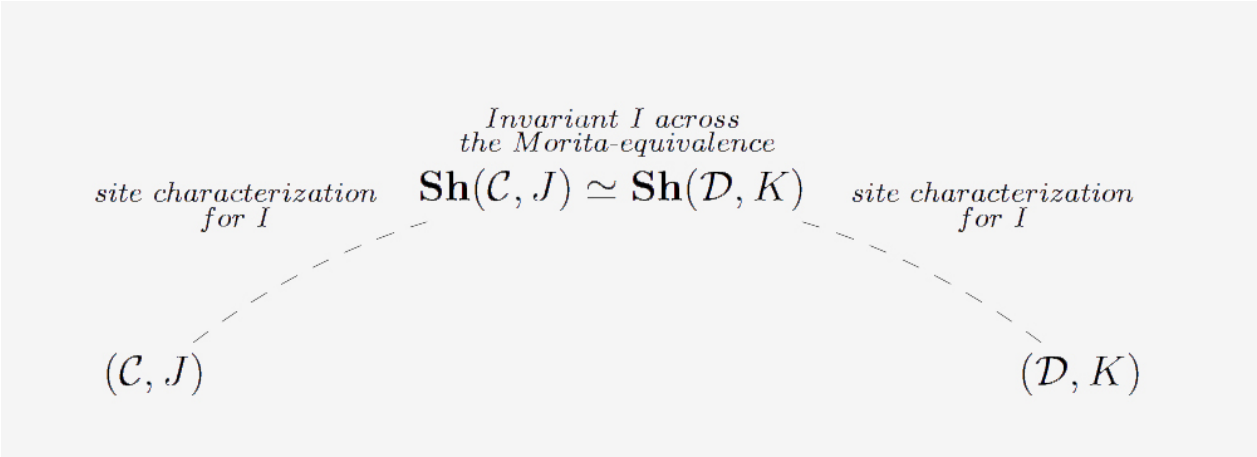
The existence of theories that are Morita-equivalent to each other translates, at the level of sites, into the existence of different sites generating the same topos (up to equivalence); indeed, to any theory one can canonically associate a site such that the topos built from it can be identified with its classifying topos.

The classifying topos of a theory can be effectively used as a 'bridge' to transfer information between the theory and any other theory that is Morita-equivalent to it, as follows. For any given property or construction of toposes which is *invariant* under equivalence of toposes (one requires this invariance because the classifying topos is

determined only up to equivalence), one tries to express it first in terms of one theory and then in terms of the other; provided that one obtains appropriate characterizations connecting properties of theories and properties of their classifying toposes (equivalently, characterizations connecting properties of sites and properties of toposes). This will lead to a logical relationship between properties of the two theories written in their respective languages:



Technically, the transfer of information across the two theories is realized by attaching to the two theories suitable sites of definition for their classifying topos (or objects of a different kind representing their classifying topos), and expressing topos-theoretic invariants on the given classifying topos in terms of these two sites by means of 'site characterizations':



A striking aspect of this technique, in addition to its level of generality (indeed, it can be applied to mathematical theories belonging essentially to any mathematical field), is the fact that it can be automated in many cases. Indeed, using the methods of Topos Theory one can obtain characterizations of the above kind for several invariants, holding

uniformly for any theory or at least for wide classes of theories (and for certain classes of invariants such characterizations can even be established in a purely mechanical way); in the presence of a Morita-equivalence, these characterizations will thus be able to act as the 'arches' of a 'bridge' connecting the two theories, making it possible to transfer information between them.

As is naturally expected, the translations between properties of Morita-equivalent theories realized by means of the 'bridge' technique can be very surprising. Indeed, a unique abstract invariant property defined at the topos-theoretic level may be expressed in completely different ways in terms of different sites of definition of a given topos.

As an example, consider the property of *completeness* of a theory: a geometric theory is said to be *complete* if every geometric assertion written over its language is either provably true or provably false in the theory. Proving that a theory is complete is generally a difficult matter. Nonetheless, this property is equivalent to a simple invariant property of the classifying topos (namely, its property of being two-valued), admitting alternative reformulations in terms of other sites of definition. For instance,[5] this invariant property is equivalent to the *joint embedding property* on a category C (i.e., the property that any two objects in the category can be mapped to a third one) in the case of a non-trivial atomic site (*Cop, Jat*) (keeping in mind that the atomic topology *Jat* on the dual of a category C satisfying the amalgamation property is the Grothendieck topology having as covering sieves precisely the non-empty ones). Notice that the joint embedding property on a category is generally a much simpler way to verify a property than proving completeness of a theory; nonetheless, for theories T whose classifying topos is a topos of sheaves on an atomic site (*Cop, Jat*), the two properties (i.e., completeness of T and joint embedding property of C) correspond to each other under a topos-theoretic 'bridge,' which thus allows one to be established by verifying the other.[6]

Why Toposes?

One might wonder what makes Grothendieck toposes so effective in serving as 'bridges' for connecting different mathematical theories with each other. There are several reasons for this, which we can summarize as follows:

. *Generality*: Unlike most of the invariants used in Mathematics, the level of generality of topos-theoretic invariants is such that they are suitable for comparing (first-order) mathematical theories of essentially any kind.

. *Expressivity*: Many important invariants arising in Mathematics can be expressed as topos-theoretic invariants.

. *Centrality*: The fact that topos-theoretic invariants often specialize to important properties or constructions of natural mathematical or logical interest is a clear indication of the centrality of these concepts in Mathematics. In fact, whatever happens at the level of toposes has 'uniform' ramifications in Mathematics as a whole.
. *Technical flexibility*: Toposes are mathematical universes that are very rich in terms of internal structure; moreover, they have a very well-behaved representation theory, which makes them extremely effective computationally when considered to be 'bridges.'
More information on the theory of topos-theoretic 'bridges' and Olivia Caramello's research can be found at www.oliviacaramello.com (http://www.oliviacaramello.com)

Footnotes

1. Those notions were introduced in Olivia Caramello. "The unification of Mathematics via Topos Theory." *arXiv:math*, June 2010. 42. Web. And further developed in Olivia Caramello. "Topos-theoretic background." IHES, September 2014. Web.

2. This can be acquired for instance by reading the first sections of Olivia Caramello. "Topos-theoretic background." *IHES September*, 2014. Web.

3. Michael Artin, Alexander Grothendieck and Jean-Louis Verdier, eds. "Séminaire de Géométrie Algébrique du Bois Marie (1963-64). Théorie des topos et cohomologie étale des schemas." *Lecture Notes in Mathematics* 2. Berlin, New York: Springer-Verlag, 1972. iv, 418. Print.

4. Michael Makkai and Gonzalo E. Reyes. "First-Order Categorical Logic." *Lecture Notes in Mathematics* 611. Berlin, Heidelberg: Springer-Verlag, 1977. 301. Print.

5. Olivia Caramello. "Fraïssé's construction fro of $\simeq$l-equivalence classes. m a topos-theoretic perspective." Logica Universalisis 8 (2). Berlin, Heidelberg: Springer Verlag, 2014. 261-281. Print.

6. Olivia Caramello. "The unification of Mathematics via Topos Theory." *arXiv:math*, June 2010. 42. Web. And "Topos-theoretic background." *IHES*, September 2014. Web.

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The Forgotten Meta-Realities of Modernism: Die Uebersinnliche Welt and the International Cultures of Science and Occultism

Linda Henderson

Richard Sheppard, writing in his otherwise excellent essay "The Problematics of European Modernism" in 1993, posited a "meta-world which was not describable in Newtonian terms" as central to modernists' conceptions of reality[1]. Although Sheppard does include a few references to science before 1920, such as the Futurist F. T. Marinetti's interest in Brownian movement, the scientists he cites are Einstein and the quantum physicists Louis de Broglie, Erwin Schrödinger, and Paul Dirac, whose works had their cultural impact only in the 1920s and beyond. This view has been very common in discussions of modernism's scientific context, beginning in the 1940s, when the myth of a connection between Cubism and Relativity Theory arose, and continuing through much of the century[2]. Even as questions were raised about the timing of Einstein's major public impact, which occurred only after the November 1919 announcement of an eclipse expedition's confirmation of one of his postulates, there was nothing yet to fill this gap[3]. The late Victorian ether physics that actually dominated the layperson's understanding of reality in this period, including the central concept of the ether of space, had itself been so totally eclipsed in cultural histories (and even in the history of science) that it was largely overlooked by scholars.

Yet the notion of an invisible "meta-world" or meta-reality suggested by Sheppard was correct and absolutely central to the worldviews of educated laypersons, including artists, in this period. That new conception of reality emerged gradually as a result of a series of widely popularized scientific discoveries in the 1890s that pointed to the existence of a

range of invisible phenomena beyond the reach of human vision[4]. X-rays, discovered by Roentgen in 1895, made solid matter transparent and raised fundamental questions about the adequacy of the eye as a sensing instrument. Further challenges to the solidity of matter followed with Becquerel's discovery of radioactivity in 1896, J. J. Thomson's identification of the electron in 1897, and, especially, the subsequent work of the Curies and Ernest Rutherford on radioactivity. Popular science writers regularly suggested that all matter might be radioactive, offering the image of objects endlessly emitting particles into the surrounding ether, a view widely promulgated by French author Gustave Le Bon in bestselling books such as *L'Evolution de la matière* of 1905. At the same time, the prominent physicist Sir Oliver Lodge argued that the ether itself might be the source of matter in his "electric theory of matter," a concept cited by both Expressionist Wassily Kandinsky and Italian Futurist Umberto Boccioni in their writings[5].

Together with X-rays, the development of wireless telegraphy in the later 1890s, based on Hertz's earlier confirmation of the existence of electromagnetic waves, focused attention on the ether of space as filled with waves vibrating at various frequencies beyond visible light, such as X-rays and Hertzian waves. Understood to suffuse all space without a gap in its "infinite continuity," as James Clerk Maxwell declared, the ether—in conjunction with radioactivity and the writings of Lodge, Le Bon, and others—offered a model of continuous cohesion and diffusion of matter[6]. And as additional functions for the ether were proposed by scientists in the later nineteenth century, the concept suggested great potential: "Ether vibrations have powers and attributes equal to any demand—even to the transmission of thought," Sir William Crookes declared in his 1898 British Association for the Advancement of Science Presidential Address[7].

„Die Uebersinnliche Welt."

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Für den Buchhandel:
Franz C. Mickl'sche Verlagsbuchhandlung in München.

Figure 1: Die Uebersinnliche Welt (Berlin), vol. 8 (January 1900)

In recent years there has been a growing scholarly recognition of the continued centrality of the ether by certain historians of science as well as of art and of occultism[8]. Rather than Einstein, the prominent scientists known to the public in the early years of the century were figures such as the physicist Sir Oliver Lodge (the ether's great champion), the chemist Crookes, and the astronomer Camille Flammarion as well as radioactivity researchers Pierre and Marie Curie. Moreover, in this era the boundary between science and occultism generally acknowledged today was not at all clear cut. Lodge, Crookes, and Flammarion were all interested in various aspects of occultism, from spiritualism to telepathy, subjects of investigation for the Society for Psychical Research of which they and many other prominent figures, such as philosopher William James, were members. At the same time, occultists such as Madame Helena Blavatsky, cofounder of the Theosophical Society in 1875, along with her successors as representatives of the movement, Annie Besant and C. W. Leadbeater, closely followed contemporary developments in science, finding there support for their arguments against materialism.

Although Besant succeeded Blavatsky as president of the Theosophical Society in 1907, it was Leadbeater who mostly directly engaged the new developments in physics and wrote prolifically about them. The themes of the ether, vibration, and the popular notion of a higher fourth dimension of space featured prominently in his writings, such as *The Astral Plane* (1895) and *Clairvoyance*(1899), which were translated almost immediately into French and German[9]. Rudolf Steiner, who in 1902 became the head of the German branch of the Theosophical Society and in 1912 inspired the establishment of its Christian-oriented offshoot, Anthroposophy, likewise drew on the newest science for his system of "occult science."[10]

The writings of Theosophists thus served as key vehicles for disseminating new scientific discoveries through the international network of Theosophical Society branches, which sponsored lectures, published journals, and encouraged book translations. We have been less aware, however, of the role that the equally prominent international network of spiritualist organizations and publications played in this promulgation of scientific ideas and occult responses to them. Just as the Theosophists drew on the new scientific discoveries, spiritualists likewise embraced in the X-ray's demonstration of ranges of waves beyond sense perception that could be captured on a sensitive photographic plate (akin to spirit photography), the dematerialization of matter suggested by radioactivity, and the potential for materialization of forms from the ether[11]. This was an exhilarating moment for anyone interested in invisible phenomena, from occultists to laypersons encountering the ubiquitous discussions of the subject in popular scientific journals to artists who found themselves liberated from the focus on visible light and shade that had dominated the métier of painting for hundreds of years[12].

In his 1994 book *Downcast Eyes: The Denigration of Vision in Twentieth-Century Thought*, historian Martin Jay quotes and extends T. J. Clark's discussion of the later nineteenth-century painting of Paul Cézanne. According to Clark, "Doubts about vision became doubts about almost everything involved in the act of painting: and in time the uncertainty became a value in its own right: we could say it became an aesthetic." Jay continues, "That aesthetic was what we call modernism, which is such movements as Cubism, Futurism, and Vorticism further explored Cézanne's demolition of the received visual order."[13] Yet, if Cézanne's was largely an individual painter's pursuit, artists from the 1890s through the 1910s had increasing stimulation from their cultural milieu to distrust sight and to seek to represent in some way reality beyond vision. Just as Jonathan

Crary in his *Techniques of the Observer*(1990) has argued for an episteme of "normative vision" in the nineteenth century, we should recognize an episteme of "non-vision" in the later nineteenth and early twentieth century that focused on invisible meta-realities[14]. In 2002 I introduced the term "vibratory modernism" to describe this overlooked aspect of modernism so evident in the writings and images of many modern artists. Yet, at that time, it was not clear how this shared culture was established internationally, apart from popular science writing. How was it, for example, that both Kandinsky in Munich and Boccioni in Milan cite the electric theory of matter as a central support for their new styles? Now, however, it can be demonstrated that there was an international culture of occultism as well as of science, which readily transcended national borders. Like the internet today, these ideas travelled rapidly on networks formed by monthly occult journals reporting on developments from all over Europe and America and even further destinations (India, particularly, for the Theosophists).

The remainder of this essay focuses on an example of that kind of cross-cultural diffusion of information, both scientific and occult—in this case, the monthly German spiritualist periodical *Die Uebersinnliche Welt*, published in Berlin from 1893 to 1922[15]. The journal's title declared its particular focus—the world beyond the senses, making it a timely index of the preoccupation with the invisible discussed above. Although the journal featured a more conventional, Egyptian-themed cover design for the years 1898-1901 and 1906-1913 (Figure 1), the remarkable cover for the years 1902-1905 (Figure 2) gives striking visual form to the invisible vibratory energies that were the focus of so much of the writing in the journal by this time[16]. The cover design by the prominent painter and graphic artist Fidus (Hugo Höppener) features a simplified landscape centered on the sun emitting radiations and clouds filled with signs of pulsating energy. Framed by an ouroboros, which had been subtly present at the center bottom of the earlier cover illustration, the central image points up the abstract potential invisible vibrations could suggest to artists—from the painter Edvard Munch in Berlin in the mid-1890s in a spiritualist-oriented circle to Kandinsky, whose archive contains several issues of the journal[17].

Both the ouroboros and the six-pointed star above it were also elements of the emblem of the Theosophical Society, and the designer Fidus was himself a Theosophist, so the cover effectively registers the complexity of German occultism at this moment. The Berlin spiritualist organization that published the journal, the Wissenschaftlichen Vereinigung "Sphinx," would increasingly seek to distinguish their approach from that of Theosophy by the years 1904-1905, as we shall see. The return of the earlier cover in 1906

restored the five-pointed star and the topic of Theosophy virtually disappeared from the journal's pages, even though the name of the London Theosophical Publishing Society, first listed in 1901 as a collaborator, continued to appear on the cover through summer 1914[18]. In the 1890s and early years of the century, however, the two groups' shared an interest in the newest science made certain Theosophical writings useful for their purposes.

Historian Corinna Treitel in her 2004 book *A Science for the Soul: Occultism and the Genesis of the German Modern* provides a superb study of the role of occultism in all its varieties in German culture in the late nineteenth and early twentieth centuries. As she explains,

> *Occultists saw themselves as part of a counterculture, locked in battle against a dominant materialist tendency of the age, and this self-understanding gave their movement its dynamism and appeal. They aspired to use occult phenomena to establish new truths about the human soul and the world it inhabited, to construct on this basis a new worldview that would make materialism obsolete.*[19]

Treitel also discusses the situation in which spiritualists found themselves—not only in competition with Theosophy but also challenged by the rising field of experimental psychology and differing positions within that developing field.

Carl du Prel, the influential, Munich-based author of *Die Philosophie der Mystik* of 1885 and a committed spiritualist by 1880, was a key inspiration for the founders of *Die Uebersinnliche Welt*, and his writings figured prominently in its issues[20]. Du Prel had developed a form of "transcendental psychology," which argued for the existence of a "transcendental subject" independent of the physical body and for a moving "threshold of sensibility" that would increasingly open up realms previously inaccessible to human consciousness.[21]" Following Treitel, Heather Wolfram and Andreas Sommer have tracked the split in the early 1890s within the German psychological community between du Prel's faction and that of his colleagues who were increasingly focused on experimental forms of psychical research, including hypnotism[22]. Wolfram chronicles the 1889 departure of du Prel and his followers from the Psychologische Gesellschaft in Munch and quotes the 1891 statement published in the journal *Sphinx* by the remaining researchers, including Albert Schrenk-Notzing, who had joined their Berlin counterparts in the Gesellschaft für Psychologische Forschung:

> *The group of scholars who branched off [i.e., Du Prel and others—LDH] emphasize more the transcendental-psychological phenomena of the abnormal mental life in the real sense (that is spiritualism, examination of Od and related areas) and go their own way undisturbed. The Psychologische Gesellschaft, however, stands on the positive ground of normal psychology and seeks in close connection with official science to expand the inductive method to anormal psychological phenomena.*[23]

Du Prel and his colleagues formed the Gesellschaft für Wissenschaftliche Psychologie, and, although he died in 1899, *Die Uebersinnliche Welt* in 1901 added to the cover page that Munich group as cosponsor and foregrounded the subtitle of the journal as "Monatsschrift für Okkultistische Forschung" [Monthly for Occult Research], emphasizing its research orientation. The journal's goal, like du Prel's was a *wissenschaftlich* (scientific) occultism. In contrast to the experimental psychologists, however, the science that interested them was not the "official science" of psychology cited above, but the newest physics that was revealing invisible realities and casting light on older concepts such as the "Od" or "Odic force" of Austrian Baron Karl von Reichenbach. In the mid-nineteenth century Reichenbach had connected his "Od" to the fluid of animal magnetism, and the concept remained of considerable interest in the later years of the century in the context of ether and electromagnetism, including in the work of occultists Albert de Rochas and Hippolyte Baraduc in Paris[24]. As du Prel had declared in 1893, "Occultism is only unknown science. It will be proven through the science of the future.[25]"

Although Theosophists and spiritualists differed on what occurred during a séance—spiritualists believed that a medium communicated with actual spirits who were present, while Theosophists understood the medium to be accessing a higher level of the self that made information accessible—they were equally interested in the justification the new developments in science could provide for their ideas. Both groups drew on the work of Lodge, Crookes, and Flammarion, along with myriad others such as Baraduc, who was carrying out experiments in Paris in the photography of thought and emotion via ether vibrations. Indeed, the "transcendental photography" of Baraduc and others, such as Commandant Darget with his "V Rays," was a prominent theme in *Die Uebersinnliche Welt* and was of particular interest to Kandinsky[26]. Besant and Leadbeater specifically cited Baraduc as their scientific counterpart in presenting patterns of thought in their 1905 book *Thought-Forms* and drew directly on Lodge's latest ideas on the ether in the appendix to their 1908 *Occult Chemistry*[27]*.* Beginning in the 1890s, the editors of *Die Uebersinnliche Welt* reproduced major lectures of and letters by Lodge and Crookes as well as the writings of Flammarion, among many others.

While Theosophists had the ubiquitous books on their doctrines being produced by the leaders of the organization, spiritualists were far more dependent on confirmations to be found in successful demonstrations of the powers of spirit mediums as well as the contemporary science that might help explain the phenomena. Texts by figures like du Prel and others appeared regularly in *Die Uebersinnliche Welt*, but crucial to the journal's *wissenschaftlich* spiritualism were the international reports of the latest séance phenomena not only in Germany but especially in Paris, London, and Milan, as well as outside Europe. Here is where the journal actually functioned as an internet-like communications network before the fact. An event occurring at a séance in Milan, for example, would be reported immediately in the following month's issue. Multilingual associates of the journal scoured international spiritualist publications and then translated relevant texts for the journal's readers. (The international "Addresse Almanach" compiled by editor Max Rahn in the later-1890s issues documents the hundred-plus spiritualist organizations around the world at the turn-of-the-century.) The Berlin group was particularly close to occultists in Paris and regularly translated articles from the *Annales des sciences psychiques* by sympathetic researchers such as Julian Ochorowicz or Rochas, who had actually cited Lodge's work on electromagnetism in one of the appendices to his *Extériorisation de la sensibilité* of 1895[28]. Both Rochas and Lodge, along with many other prominent scientists, such as French physiologist Charles Richet and Italian criminologist Cesare Lombroso, had participated in séances with the medium Eusapia Palladino, whose varying fortunes *Die Uebersinnliche Welt* followed closely[29]. For the early years of the journal, through the period of its theosophically oriented Fidus cover (1902-1905), writings by Theosophists offered highly accessible responses to the implications of the latest scientific discoveries, such as the X-ray. Indeed, the two groups at that point were not mutually exclusive, and the journal published a series of articles by its own H. Strebel, "Kraft und Stoff in 'Astralen,'" during 1899 and 1900, with extensive discussion of Od and ether vibrations on the astral plane[30]. Strebel himself was drawing in part on the writings of Leadbeater, whose *The Astral Plane: Its Scene, Inhabitants and Phenomena* (1895) had appeared in German in 1896. The discovery of the X-ray gave Leadbeater as well as the spiritualists a new touchstone to argue for the limited nature of perception on the physical plane[30]. In its August and September 1903 issues *Die Uebersinnliche Welt* published a summary of Leadbeater's 1901 Chicago lecture on "The Unseen World," which had appeared in that city's spiritualist newspaper *The Progressive*

Thinker and then in *The Theosophist*[31]. An editorial note explained that while the journal did not agree with Leadbeater's Theosophical views, the editors believed that the lecture raised important issues from contemporary science relevant to their readers.

The Chicago and Berlin editors were apologizing for the specific Theosophical content in Leadbeater's text—particularly this argument for the higher and successively refined planes of existence Theosophists posited as continuous with the physical world. These included the astral and mental planes, with "etheric matter" as the first step (still on the physical plane) toward the "finer subdivisions of matter," including a Heaven-World he identified with the mental plane[32]. Although Leadbeater presented the ether as a "state of matter beyond solid, liquid, and gas" and a step toward the astral plane, his language in fact paralleled contemporary discussions in physics, so that many of his ideas would have seemed somewhat familiar to his listeners. "We never see the ether which carries the vibrations of light though we may demonstrate its necessity as a hypothesis to explain what we find," he asserts[33]. Or, "All sensation is a matter of vibration" and "the whole secret of the Roentgen rays, or the X-ray [,] is simply bringing within the capacity of your eye … a few more rays, a few of the finer rates of vibration …."[34] According to Leadbeater, while these finer vibrations escape most people, there are objects around us that "do reflect these other rates of vibration which we do not see" and "some of such things can be photographed."[35] To illustrate that point he discusses Baraduc, recounting his personal experience of his work "when I was last there" and asserting that the Frenchman had "experimented in a regular scientific way" and had "succeeded in photographing the invisible."[36] Continuing his focus on the invisible, Leadbeater explains, "The etheric sight … is simply an added power of responding to vibrations in the same manner as the Roentgen ray scheme; and you will find that much of the clairvoyance on a small scale, which is done by spirits at séances is just exactly that type."[37]

For the spiritualists at *Die Uebersinnliche Welt*, who laid claim to a scientific approach, Leadbeater's arguments for Theosophy's validity at the end of his lecture would have been troubling. Could Theosophy really be, as he asserted, absolutely "scientific," the "apotheosis of common sense," and the "Wisdom-Religion of all time"[38]? Indeed, when the second installation of Leadbeater's text appeared the next month, September 1903, it was preceded by an article by Dr. Franz Freudenberg, a regular contributor, titled "Ein interessantes Kapitel aus Flammarion's 'L'Inconnu.'" Introduced by Freudenberg, the excerpt from Flammarion's *L'Inconnu* included the "table of vibrations" Crookes had first set forth in his Presidential Address before the Society for Psychical Research in 1897 in

an argument about the relativity of knowledge[39]. This was a rudimentary form of the developing electromagnetic spectrum (with sound vibrations incorporated), emphasizing the "Unknown" ranges inserted between the then-identified X-rays, "Light" ("luminous rays, caloric and chemical rays, spectra of the infra-red to the ultra-violet spectrum"), and "Electricity," which was widely reproduced in English-language literature in this period as well as in the *Revue Scientifique*[40]. Crookes's table of vibrations had clearly been a source for Leadbeater, and the inclusion of the excerpt from the spiritualist Flammarion made clear that non-Theosophists had also drawn important conclusions from it. Crookes himself was a crucial touchstone for the journal, and in July 1903—even before the Leadbeater articles appeared—prominent contributor Professor Karl Obertimpfler had reported on "Sir William Crookes in Berlin." Crookes was in the city for an international chemistry congress, and Obertimpfler recounts his personal meeting with Crookes who gave there his lecture "Modern Views of Matter."[41] Obertimpfler summarized aspects of Crookes's talk on the newest ideas about the nature of matter, including Thomson's identification of the electron and the current research by the Curies. This was a critical moment for the journal's future, because the popularization of radioactivity would provide spiritualists new scientific sources that would take them into territory clearly separate from Theosophy. For Theosophists, the understanding of the atom would still be dominated by Besant and Leadbeater's clairvoyant "Occult Chemistry," on which they had begun to publish in 1895 and which they would publish in book form in 1908[42]. Although the *Die Uebersinnliche Welt* cover design would remain the same through 1905, the journal's discussion of the newest aspects of physics and chemistry would become increasingly prominent. In his subsequent new year's essay, "Zum Jahreswechsel 1904," Obertimpfler would celebrate the newest developments in radium research, including its transformation into helium in the work of William Ramsay and the implications of this "transmutation" for spiritualists. "Occultism is the father of the science of the future," he concluded, just as du Prel had asserted, "Occultism is only unknown science" that "will be proven through the science of the future."[43] In his "Zum Jahreswechsel 1905" text a year later, Obertimpfler concluded confidently, "Ours is the future!"[44]

Figure 2: Die Uebersinnliche Welt (Berlin), vol. 10 (January 1902). Design by Fidus (Hugo Höpperner)

In July 1904 *Die Uebersinnliche Welt* began publishing articles focused specifically on science by a new contributor, Robert Blum, and the journal now truly became a source of current scientific information with bearing on the case for the validity of spiritualism. Typically, the ether and the names of figures like Lodge and Crookes remained prominent, at the same time that new figures such as the Frenchman Le Bon became relevant to the spiritualist interest in themes such as materialization and dematerialization[45]. In 1906 Blum published a book drawing on his writing for the journal on science and occultism, which he titled, somewhat curiously, *The Fourth Dimension*. Even though the book had little to do with that subject specifically, it was a term strongly associated with spiritualism because of the activities of Leipzig astronomer J.C.F. Zöllner and the medium Henry Slade in the 1870s[46]. Most interestingly, however, is the second section of Blum's three-part book, titled "Die Irrtümer moderner Theosophie" [The Errors of Modern Theosophy][47]. This was the same year *Die Uebersinnliche Welt* reverted to its earlier cover design, despite the fact that Fidus's

imagery suggested so effectively the very energies that were now even more central to the journal's scientific interests. The tolerance for Theosophy was gone, and the names of Theosophists would subsequently appear only occasionally in the announcements of newly published books.

Seven issues of *Die Uebersinnliche Welt* from 1904, 1906, and 1908 are preserved in the Kandinsky-Gabriele Münter library at the Lenbachhaus in Munich, along with a number of other spiritualist sources in addition to his other books. One of these issues (January 1908) features an article on the "transcendental photography" that so interested the artist, including the work of Baraduc and Darget[48]. Commandant Darget, whose book on photographing "V-rays" Kandinsky acquired in its French edition, would work closely with the journal's editors in subsequent years, and they even published a German translation of his book[49]. It is a reminder that despite Kandinsky's growing allegiance to Rudolf Steiner, he was operating in a milieu in which various strands of occultism (some competing) intermingled[50]. In *On the Spiritual in Art*, published in late 1911, the artist notes "Dr. Steiner" and mentions Blavatsky briefly in his text (reflecting back on Theosophy), but he then lists in a footnote "Zöllner, Wagner, Butlerov, Crookes, Ch. Richet, C. Flammarion," as well as "C. Lombroso," all of whom were associated with both science and spiritualism[51]. Kandinsky was also interested in the work of Albert de Rochas, another close associate of *Die Uebersinnliche Welt*[52]. With his references to the "further division of the atom" and to the "electric theory of matter," Kandinsky had clearly absorbed a variety of intellectual stimuli as he developed his artistic theory and pioneering style of abstract painting[53]. And based on spiritualism, Theosophy, and the thought transfer embodied "transcendental photography," he had good reason to believe his paintings could set up vibrations in the soul of a viewer[54].

Contemporary science, centered on ether physics, was the grounding on which both Theosophists and spiritualists were drawing heavily, and, as we have seen, occult journals like *Die Uebersinnliche Welt* served as critical vehicles for the international transmission of the newest scientific ideas and the varying occult responses to them. It is little wonder that the Futurist Boccioni—interested in spiritualism and, briefly, Theosophy in Italy—would share Kandinsky's scientific interests, including the "electric theory of matter"; journals such as *Ultra: Rivista Teosofica di Roma* were publishing much of the same type of content. This is true, too, of the situation in Paris, where an artist like Kupka (himself a spiritualist also interested in Theosophy) could read much of the same kind of information in the Parisian journal *La Vie Mystérieuse*, whose editorial board included associates of the Salon Cubist circle, poet Alexander Mercereau and publisher

Eugène Figuière[55]. With its Paris counterpart—first the Librarie Spiritualiste and then Hector Durville's Librairie du Magnétisme—as well as its links to figures like Rochas and Darget as well as the *Annales des sciences psychiques*, *Die Uebersinnliche Welt* was closely connected to activities in Paris—a bond that only the coming of World War I could break. It is clearly time to explore this long forgotten underpinning of modernism in the international cultures of science and occultism and the stimulating focus on invisible meta-realities to which they gave rise.

Footnotes

1. Richard Sheppard. "The Problematics of European Modernism." *Theorizing Modernism*. Ed. Steve Giles. London: Routledge, 1993. 14. Print.

2. See Linda Dalrymple Henderson. "Four-Dimensional Space or Space-Time?: The Emergence of the Cubism-Relativity Myth in New York in the 1940s." *The Visual Mind II*. Ed. Michele Emmer. Cambridge: MIT Press, 2005. 349-97. Print. See also Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art* (1983). Rev. ed. Cambridge, MA: The MIT Press, 2013. Appendix A. Print.

3. On Einstein's theories and their reception, see, e.g., Helge Kragh. *Quantum Generations: A History of Physics in the Twentieth Century*. Princeton: Princeton University Press, 1999. 90-104. Print.

4. On these discoveries, see, e.g., L. D. Henderson, "Editor's Introduction: I. Writing Modern Art and Science—An Overview; II. Cubism, Futurism, and Ether Physics in the Early Twentieth Century." *Science in Context* 17 (Winter 2004): 423-66. Print.

5. See Sir Oliver Lodge. "Electric Theory of Matter." *Harper's Monthly Magazine* 109 (Aug. 1904): 383-89. Print. See also Kandinsky. "On the Spiritual in Art." *Kandinsky: Complete Writings on Art.* Eds. Kenneth C. Lindsay and Peter Vergo. New York: Da Capo, 1994. 142. Print. And Umberto Boccioni. *Pittura scultura futuriste (dinamismo plastico)*. Milan: Edizioni Futuriste di "Poesia," 1914. 105. Print.

6. Maxwell, as quoted by Sir Oliver Lodge in *The Ether of Space*. New York and London: Harper & Brothers, 1909. 114. Print. On the history of the ether, see, e.g., G. N. Cantor and M. J. S. Hodge. *Conceptions of Ether: A Study in the History of Ether Theories 1740-1900*. Cambridge: Cambridge University Press, 1981.

7. "Address by Sir William Crookes, President." *Report of the Sixty-Eighth Meeting of the British Association for the Advancement of Science* (1898). London: John Murray, 1899. 31. Print. Crookes's text was reproduced in part in *Die Uebersinnliche Welt* 2 (Feb. 1899): 57-61. Print.

8. See, e.g., L. D. Henderson. "Vibratory Modernism: Boccioni, Kupka, and the Ether of Space." *From Energy to Information: Representation in Science and Technology, Art, and Literature*. Eds. Henderson and Bruce Clarke. Stanford: Stanford University Press, 2002. 126-49. Print; Courtney Grean Raia. "From Ether Theory to Ether Theology: Oliver Lodge and the Physics of Immortality."

Journal of the History of the Behavioral Sciences 43 (Winter 2007): 19-43. Print; Richard Noakes. "The 'World of the Infinitely Little': Connecting Physical and Psychical Realities Circa 1900." *Studies in the History and Philosophy of Science* 39 (2008): 323-34. Print; Egil Asprem. "Pondering Imponderables: Occultism in the Mirror of Late Classical Physics." ARIES 11/2 (2011): 129-65. Print; and Asprem. *The Problem of Disenchantment: Scientific Naturalism and Esoteric Discourse 1900-1939*. Leiden: Brill, 2014. Print.

9. For the interest in science by Blavatsky and other occultists, see Henderson. "Vibratory Modernism." Op. cit. On the popularization of interest in a possible fourth dimension of space via Leadbeater's writings, see Henderson. *Fourth Dimension and Non-Euclidean Geometry in Modern Art*. Op. cit. Chap. 1. Print.

10. On Steiner, see, e.g., Helmut Zander. *Rudolf Steiner: Die Biographie*. Munich: Piper, 2011. Print. Steiner was virtually ignored by the editors of *Die Uebersinnliche Welt* as he rose to prominence in the context of German occultism.

11. For some time, a number of German scholars have been actively exploring spiritualism and its cultural impact as part of an interest in media history and technology. Wolfgang Hagen's essay "Der Okkultismus des Avantgarde um 1900" [in *Konfigurationen: Zwischen Kunst und Medien*. Eds. Sigrid Schade and Georg Christoph Tholen. Munich: Fink, 1999. Print.] exemplifies this scholarship, as does Stefan Andriopoulos's book *Ghostly Apparitions: German Idealism, the Gothic Novel, and Optical Media* [New York: Zone Books, 2013. Print.]. Such authors find in spiritualism (and related occult concerns in France) a prototype for the emergence of the technology of telegraphy as well as an important stimulus for modernist creation. Corinna Treitel's book *A Science for the Soul: Occultism and the Genesis of the German Modern* [Baltimore: Johns Hopkins Press, 2004. Print.] is the first book-length study in English of the important role of occultism, including spiritualism, in the emergence of modern culture in Germany in the late nineteenth and early twentieth centuries. On spiritualism and Anglo-American modern literature, see Tim Armstrong. *Modernism: A Cultural History*. Cambridge: Polity Press, 2005. Chap. 6: "The Vibrating World: Science, Spiritualism, Technology." Print.

12. The vast amount of popular literature on these subjects can be sampled readily through periodical indices such as T*he Reader's Guide to Periodical Literature* (now digitized); for a sampling of this literature in France, see, e.g., the bibliography by topic in L. D. Henderson. *Duchamp in Context: Science and Technology in the Large Glass and Related Works*. Princeton: Princeton University Press. 1998. Print.

13. See Martin Jay. *Downcast Eyes: The Denigration of Vision in Twentieth-Century Thought*. Berkeley: University of California Press, 1994. 159. Print.

14. See Jonathan Crary. *Techniques of the Observer: On Vision and Modernity*. Cambridge: The MIT Press, 1990. 16. Print, where he builds on the theories of Michel Foucault.

15. The founding editor in of *Die Uebersinnliche Welt* [henceforth, DUW] in 1893 was Max Rahn. Ulrich Linse describes the journal as "one of the highest quality German publications," in a brief discussion in "Der Spiritismus in Deutschland um 1900." *Mystique, mysticisme et modernité en Allemagne autour de 1900.* Strasbourg: Presses Universitaires de Strasbourg, 1998. 101. Print.

16. With the outbreak of war in August 1914, the journal changed to German script and never returned to its original cover after the war. For a group so international in its orientation and so close to their French associates, the war was a wrenching shock.

17. On the artist Fidus, see, e.g., Janos Frecot, Johann Freidrich Geist, and Diethart Kerbs. Fidus, *1868-1948: Zur ästhetischen Praxis bürglicher Fluchtbewegunen*. Munich: Rogner & Bernhard, 1972. Print. On Munch, spiritualism, and the new science, see, e.g., Pascal Rousseau. "Radiation: Metabolising the 'new rays.'" *Edvard Munch: The Modern Eye*. Exh. cat. London: Tate Publishing, 2012. 160-69. Print. For Kandinsky's issues, see note 48 below.

18. Theosophists' names would appear only occasionally in the book review section of the journal. From 1902 to 1905, while the cover bore the six-pointed star design by Fidus, the group maintained a line drawing of a sphinx in profile against a five-pointed star (introduced in 1893) at the top of the initial page of text in each issue.

19. Treitel. *Op. cit*. 16

20. On du Prel, see Thomas P. Weber. "Carl du Prel (1839-1899): Explorer of Dreams, the Soul, and the Cosmos." *Studies in the History and Philosophy of Science* 38 (2007): 593-604. Print. Weber cites an August 1880 letter from du Prel to J.C.F. Zöllner, documenting his having become a spiritualist (597).

21. See Carl du Prel. *The Philosophy of Mysticism*. Trans. C. C. Massey. London: George Redway, 1889. Vol. 2. 130-65: "The Transcendental Subject." Print. For moving "threshold of sensibility," see 129ff. In his chapter on "Psychic Television," Andriopoulos includes a discussion of du Prel's interest in "television" in relation to wave-borne thought transfer; see Chap. 5: "Ghostly Apparitions."

22. See Treitel. Op. cit. Chap. 2; Wolfram. T*he Stepchildren: Psychical Research and Parapsychology in Germany*, c. 1870-1939. Amsterdam: Rodopi, 2009. Print; and Andreas Sommer. "Normalizing the Supernormal: The Formation of the 'Gesellschaft für Psychologische Forschung' ('Society for Psychological Research'), c. 1886-1890." *Journal of the History of the History of the Behavioral Sciences* 49 (Winter 2013): 18-44: Print.

23. M. Offner. "Die deutsche Gesellschaft für psychologische Forschung." *Sphinx* 18/66 (1891): 334 (1). Print. Quoted in Wolfram. Op. cit. 70. Although du Prel had been closely involved with the journal *Sphinx* from its founding in 1886, it increasingly focused on empirical psychical research (Sommer, "Normalizing the Supernormal"); ultimately, however, in 1892 editor Wilhelm Hübbe-Schleiden, a Theosophist, redirected the journal's focus to Theosophy.

24. On Reichenbach, Rochas, and Baraduc, see, e.g., Rolf. H. Krauss. *Beyond Light and Shadow: The Role of Photography in Certain Paranormal Phenomena: An Historical Survey*. Trans. Timothy Bell and John Gledhill. Munich: Nazraeli Press, 1995. Print. Krauss also addresses the thought photographer Louis Darget (discussed further below). On Rochas and Baraduc, see Henderson. "Vibratory Modernism." Op. cit.

25. Carl du Prel. Spiritismus. Leipzig: P. Reclam, 1893. 15. Print. Quoted in Eberhard Bauer. "Spiritismus und Okkultismus." *Okkultismus und Avant-garde: Von Munch bis Mondrian* 1900-1915. Ed. Veit Loers. Exh. cat. Frankfurt: Schirn Kunsthalle, 1996. 60. Print.

26. On Darget, see the sources cited in note 24 as well as the discussion of Kandinsky's interest in Baraduc and Darget in note 48.

27. See Annie Besant and C. W. Leadbeater. *Thought-Forms*. London: Theosophical Publishing Society, 1905. 12-14. Print; and Besant and Leadbeater. *Occult Chemistry: A Series of Clairvoyant Observations on the Chemical Elements*. London: Theosophical Publishing Society, 1908. Appendix: "The Aether of Space." Print.

28. See Henderson. "Vibratory Modernism." Op. cit. 141.

29. See, e.g., "Prof. Oliver Lodge's Bericht über Eusapia Paladino [sic]." *DUW* 3/3 (March 1895): 45-50. Print. On Lodge and Eusapia, see Richard Noakes. "Haunted Thoughts of the Careful Experimentalist: Psychical Research and the Troubles of Experimental Physics." *Studies in History and Philosophy of Biological and Biomedical Sciences* 48 (2014): 46-56. Print.

30. H. Strebel's "Kraft und Stoff in 'Astralen'" appeared monthly in the issues for March-May 1899 (vol. 7, nos. 3-5) and for March-September and then December 1900 (vol. 8, nos. 3-8/9 and 12). Print. Strebel's commitment to Theosophy was clear in his intervening two-part article "Ein Lanze für indische Psychologie under Theosophie." *DUW*, 8/10 (Oct. 1900): 370-79; and 8/11 (Nov. 1900): 410-28. Print.

31. See "Die Welt, die wir nicht sehen" [excerpt by Gunther Wagner]. *DUW*, 9/8 (Aug. 1903): 315-20; and DUW, 9/9 (Sept. 1903): 336-40. Print. The citation provided in *DUW* is to C. W. Leadbeater. "The Unseen World." *The Theosophist (*Adyar, Madras) 22/8 (May 1901): 458-65; and 22/9 (June 1901): 520-27. Print. In the summary below, I provide page references to both sources, using Leadbeater's original English.

32. Leadbeater. "Unseen World." *Theosophist* 22/8 (May 1901): 462; 22/9 (June 1901): 524; and "Die Welt." *DUW* 9/8 (Aug. 1903): 318; 9/9 (Sept. 1903): 340. Print.

33. Leadbeater. "Unseen World." *Theosophist*, 22/8, 462; and "Die Welt." *DUW* 9/8. 318. Print.

34. For "all sensation," see Leadbeater. "Unseen World." *Theosophist* 22/8: 464; "Die Welt." *DUW* 9/8: 320; for "whole secret," see Leadbeater. "Unseen World." *Theosophist* 22/8: 465; "Die Welt." *DUW* 9/9: 336.

35. Leadbeater. "Unseen World." *Theosophist* 22/8: 465; "Die Welt." *DUW* 9/9: 336.

36. Leadbeater. "Unseen World." *Theosophist* 22/9: 520; "Die Welt." *DUW* 9/9: 336-37.

37. Leadbeater. "Unseen World." *Theosophist* 22/9: 521; "Die Welt." *DUW* 9/9: 337.

38. Leadbeater. "Unseen World." *Theosophist* 22/9: 527; "Die Welt." *DUW* 9/9: 340.

39. See "Ein Interessantes Kapitel aus Flammarion's "L'Inconnu" [reported by Dr. Franz Freudenberg]. *DUW* 9/9 (Sept. 1903): 330-36. Print. See Camille Flammarion. *The Unknown*. New York and London: Harper & Brothers, 1900. 12. Print. For Crookes's original lecture, see "Sir William Crookes on Psychical Research." *Annual Report of the Smithsonian Institution*, 1899. Washington, D. C.: Government Printing Office, 1901. 185-205. Print.

40. See William Crookes. "De la relativité des connaissances humaines." *Revue Scientifique* 4th ser. 7 (May 15, 1897): 609-13. Print.

41. See Prof. Carl Obertimpfler. "Sir William Crookes in Berlin." *DUW* 11/7 (July 1903): 269-73.

42. See note 27.

43. Prof. Carl Obertimpfler. "Zum Jahreswechsel 1904." *DUW* 12/1 (Jan. 1904): 3, 5. Print; for du Prel's statement, see note 25.

44. Prof. Carl Obertimpfler. Op. cit. 3.

45. See R.B. [Robert Blum]. "Grundgesetze des 'Okkultismus.'" *DUW* 12/7 (July 1904): 252-64. Print, in which Blum mentions Lodge and Crookes, along with Heinrich Hertz.

46. On Zöllner, see Treitel. Op cit. Chap. 1; and Henderson. *Fourth Dimension and Non-Euclidean Geometry in Modern Art*. Op. cit. Chap. 1.

47. See Robert Blum. *Die Vierte Dimension*. Stuttgart: Verlag Altmann,1906. Prin

48. See J. Peter. "Transcendental-Photographie." *DUW* 16/1 (Jan. 1908): 4-18. The library is held by the Gabriele Münter und Johannes Eichner Stiftung, which is located at the Lenbachhaus. Sixten Ringbom was the first scholar to discuss Kandinsky's interest in Baraduc, Darget, and Rochas, based on this archive; see Ringbom. *The Sounding Cosmos: A Study in the Spiritualism of Kandinsky and the Genesis of Abstract Painting*. Åbo, Åbo Akademi, 1970. 53-55. Print; on Rochas, see 122-23. On the photographers, see again note 24.

49. See Commandant Darget. *Exposé des différentes méthodes pour l'obtention de photographies fluido-magnétiques et spirites: rayons V (vitaux).* Paris: Edition de l'Initiation, 1909. Print.

50. On Kandinsky's art and theory, see, e.g., L. D. Henderson. "Abstraction, the Ether, and the Fourth Dimension: Kandinsky, Mondrian, and Malevich in Context." *Kandinsky, Malewitsch, Mondrian: Der Weisse Abgrund Unendlichkeit/The Infinite White Abyss.* Eds. Marian Ackermann and Isabelle Malz. Exh. cat. Düsseldorf: Kunstsammlung Nordrhein-Westfalen, 2014. 37-55 (German). 233-44 (English). Print.

51. See Kandinsky. "On the Spiritual in Art." In *Complete Writings*. Eds. Lindsay and Vergo. Op. cit. 143, 45; Kandinsky also mentions Palladino in relation to Lombroso [143]. While Ringbom discussed the various figures in Kandinsky's list in *The Sounding Cosmos* [Op. cit. 50-52], he dismissed spiritualism as a relevant source for Kandinsky [56].

52. See Ringbom. Op. cit. 122-23.

53. See again note 5. See also Kandinsky. "Reminiscences/Three Pictures" (1913). In *Complete Writings*. Eds. Lindsay and Vergo. *Op. cit*. 364.

54. See, e.g., Kandinsky. "On the Spiritual in Art." In *Ibid*. 157-60.

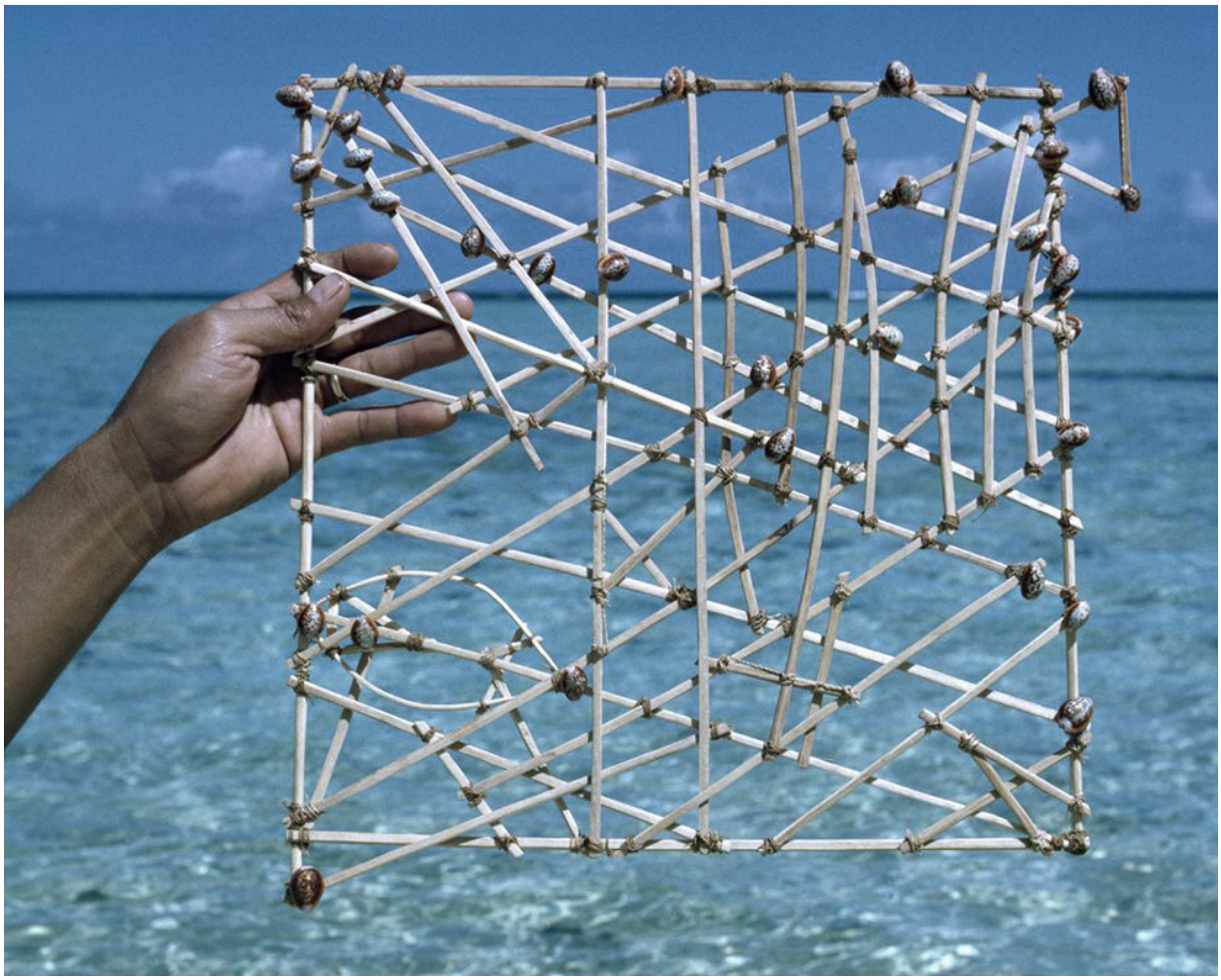
55. On Boccioni and Kupka, see Henderson. "Vibratory Modernism." Op. cit. Along with Kandinsky, they are both part of a current book project: *The Energies of Modernism: Art, Science, and Occultism in the Early 20th Century*. For *La Vie Mystérieuse* and a sampling of occultism in Paris, see L. D. Henderson. "Mysticism, Romanticism, and the Fourth Dimension." *The Spiritual in Art: Abstract Painting 1890-1985.* Exh. cat. Los Angeles: Los Angeles County Museum of Art, 1986. 227-28. Print.

Linda Dalrymple Henderson is the David Bruton, Jr. Centennial Professor in Art History, a University Distinguished Teaching Professor, and a Regents' Outstanding Teaching Professor at the University of Texas at Austin.

The Way of the Pacific: Glass Bead in conversation with Freeman Dyson

Freeman Dyson

Freeman Dyson is 93 years old. He is one of the most prominent physicist and mathematician of the past century. His vast contributions to science range from the unification of quantum electrodynamics to the conception of nuclear propelled spaceships. All throughout his intellectual carrier he has had a constant practice of scientific and literary thought experiments which he compiled in a great number of books and articles. Glass Bead went to meet him in his office at the Institute for Advanced Studies in Princeton to talk about these speculations. As planned, things took a cosmical tangent.



Micronesian Stick Chart (Photograph by Walter Meayers Edwards)

Glass Bead: In a 1960 article,[1] you speculated on the possibility of a mega structure built around the sun and capturing its radiation for the energetic demands of a future type of civilization which would live on its inner surface. This structure, which later came to be called a "Dyson sphere," opened the path to numerous wild interpretations and misunderstandings. What was your original intention when talking about such a structure?

Freeman Dyson: I might just say how this idea started. I have always considered the future of life in space. That was my concern since the beginning. It mostly came from my reading of science fiction and, actually, if any name should be attached to this object it should be Olaf Stapleton,[2] not mine. Anyhow, I think it was in 1960 when SETI [Search for Extra-Terrestrial Intelligence] first suggested listening to radio signals in the sky. Listening for alien signals was certainly a good idea, but I remember saying to Philipp Morrison, who was heading the program then, "But what do we do if the aliens don't want to communicate?" So it occurred to me that the thing we would need to do is to

listen for infrared radiation instead of radio. Because if you have a civilization that is using a lot of energy, it has to radiate some waste heat, and waste heat is infrared radiation which we can detect. But then, the question became: what would you actually be seeing in such a case? If you did detect infrared, it would have to be coming from a big surface because that's what it takes to radiate large amounts of power. So it had to be a big surface of some kind, and I suggested it would be coming from an "artificial biosphere." That's the word I used, and that was misinterpreted as a big round ball. Of course, it doesn't have to be a big round ball; it is most likely to be large objects orbiting around the star.

GB: So this idea of a large ball encapsulating the sun wasn't your plan? You didn't describe such an object?

FD: No, never. I simply used the wrong words. I said: if you take planet Jupiter and spread it out around the sun, it would make a sphere 5 meters thick. So that's where it comes from. Anyhow, what I was interested in at the time was not at all the structure itself and its engineering but a new way to look for aliens. If you look at what really happened, twenty years after I made this suggestion, we did have the first sky survey in infrared with the IRAS satellite. That was an infrared astronomy satellite. They did a sky survey in exactly the right wavelength, and of course the result was that the sky is full of these objects: there are millions and millions of such objects all over the sky, and obviously most of them are natural. They are actually young stars so the dust is still there. So you have a young star with dust around it, and the dust is warm; it radiates. And that is what we see: there is no way to tell whether it is artificial or natural. So in fact it is not a good way to look for aliens.

GB: Do we have any tools to detect this distinction between the natural and the artificial?

FD: Yes, of course. At the moment there is big excitement because we have the Kepler mission, which is actually looking at stars with very precise photometry by measuring the brightness of a star much more accurately than we ever did before. It is a wonderful mission. Its main purpose was initially to discover planets—and they did discover about two thousand planets going around other stars, and this is of course a huge step forward—but what is also true is that when you do that you discover a few other things as well. As a matter of fact, there is one very particular object which is now very much being talked about: it is called the KIC 8462852. It's one of these stars that shows very strange absorption of light (much more than a planet), with its light turning off something like twenty percent and coming on again, and it's not periodic, so it might be that it is truly an alien civilization. Of course everybody is thinking that it might be the

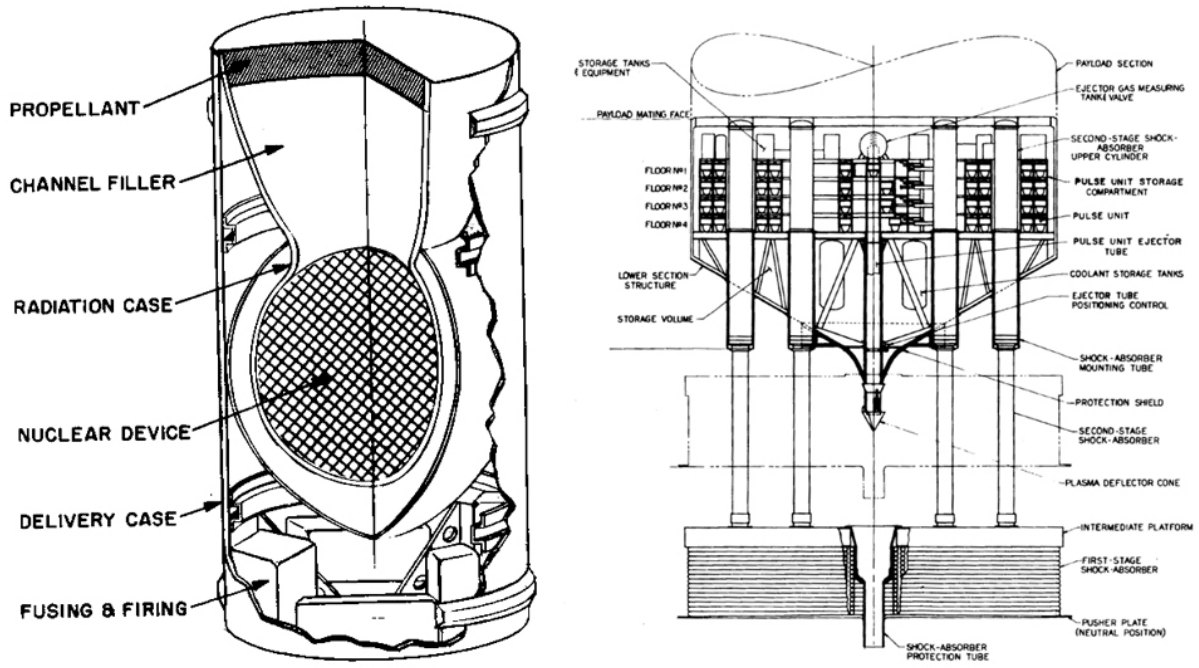
explanation, but until now we know nothing much except the light absorption. So the next thing many people are now planning to do is to observe it in different ways. And the most obvious one is to look at it with a very good radio telescope. That will be done. So with these radio signals, if it is artificial there should be something to see. But if we don't find anything in the radio, then probably it is natural, and in that case we will have to look at other channel x-rays and different good spectroscopy. This is certainly a good time for looking for aliens.

GB: You often speak of another specific technique for looking for alien life which you call "pit lamping," a Canadian hunting technique used to detect nocturnal animals by shining a spotlight in their eyes. You suggested that a similar technique could be used to detect creatures which, while living in remote parts of outer space, would have developed some kind of lens to concentrate light. Could it be used in this case?

FD: If you want to keep warm away from a star in a very cold space, you have to have something like a big mirror to concentrate star light. If you have a big mirror concentrating starlight and your living creature can be at the focus, it can stay warm. So that's what would have to happen if life were to spread far out away from a star. But unfortunately this object they have now discovered, KIC 8462852, is so far away from us. With pit lamping in this case, it would take more than two hundred years to get the light signal back. Pit lamping from Earth can work as far the Kuiper Belt, but not much further unfortunately.

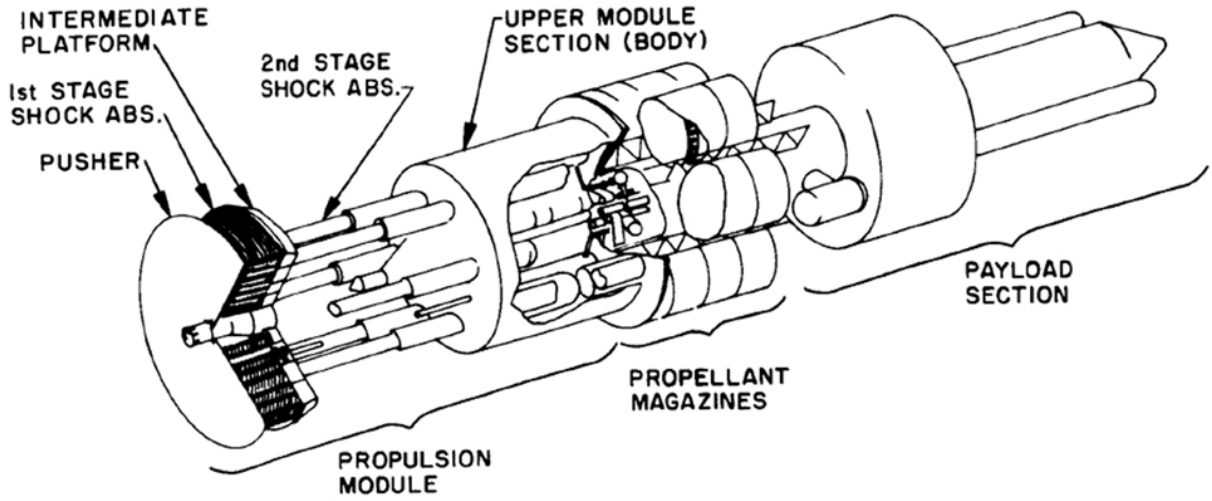
GB: Around the time you published these speculative articles and thought experiments on artificial radiations and extraterrestrial life, you were involved in an actual large scale engineering project called Project Orion,[3] the study for a spacecraft which would be propelled by atomic bombs. I even read somewhere that you were actually planning to go on board and leave. Can you tell us more about this project and your involvement in it?

FD: Well the project for that was very clear: we wanted to go first to Mars and then to Enceladus, one of the moons of Saturn. We had chosen Enceladus as a destination without knowing how interesting it actually was. Although we now know it is a very active world with all kinds of mysteries, for us at the time it was pretty much just a point in the sky.



Orion's design for Propulsion Unit and Propulsion Module. (Nasa)

This was in the days before we had long distance communications, so we were thinking of ourselves like Darwin going on board his ship the HMS Beagle for five years to explore the world, and then coming home and writing books. That was the idea we had: that we would go with this Orion ship and walk around Mars and walk around Enceladus and other places and write down everything in notebooks, and then we would come home five years later and tell the world and spend the rest of our lives writing books. That would have been a wonderful trip, even our son who was then five years old wanted to come. But anyhow it never got to fly.



Key Components of the Orion's Spacecraft (Nasa)

GB: I know the project was abandoned, but I was wondering, what could really have happened in space travel if it had been taken on?
FD: We would have been very far ahead. We would have explored the solar system fifty years sooner. But what happened is that the instruments got very much better. Now we have broadband communication even from Pluto, so that the old-fashioned kind of Darwin expedition makes no sense at all. Everything can be done in real time, communications both ways with much smaller and much more powerful instruments, so you don't actually need humans for doing scientific work. The idea of Darwin-style exploring is completely obsolete.
GB: So manned space travel has to be given up entirely?
FD: Well, it doesn't have to be given up, but it is not for science. It is an international sporting event. The public is willing to pay for sporting events, and it should be sold as such—not as science. That was the mistake they made with the moon project: it was sold as science, and of course it wasn't at all.
GB: How close were you to actually building such a spacecraft?
We were in the competition for the moon exploration and we started about the same time as the Apollo program, which was based on chemical propulsion. So I would say for about a year we were really serious. We thought we had a chance if everything went well, but of course we didn't have anything built at that time. It was only plans. By the second year it had become clear that Von Braun was going to win. He was much more organized. He had a big space center working for him, and he was also a very capable manager. For

us, most of it was purely theoretical. We had plans, but we never got to the point of doing things on a big scale. So the project lasted seven years in total, but after the second year it was really not for real.

GB: Do you think this technology could be taken on again?

FD: No, never. It is absurd. It is completely absurd when you now have instruments which are so small. The thing about Orion is that it had to have a thousand tons of payload. Now we wouldn't know what to do if we were to have a thousand tons of payload.

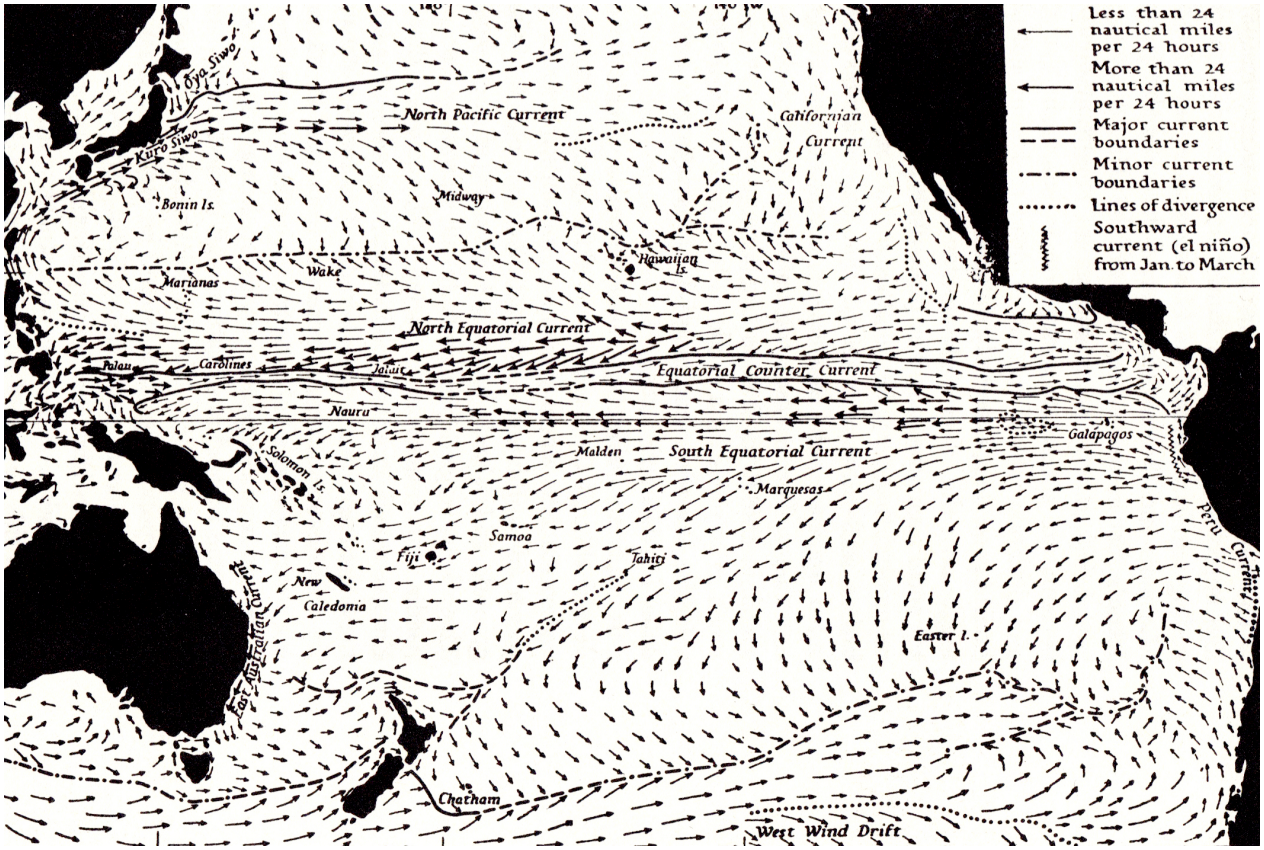
GB: What about the speed it could allow?

FD: Well, it is good for the solar system, but not good beyond. Beyond that, what you need are laser beams. They are much better. This is a public highway system, so you don't take the energy with you; rather the energy source remains fixed. You have a huge laser in space which is using sunlight as a generator. The laser beam is pointed wherever you go and then you ride the laser beam using this energy. And for sure, that's much more efficient than all the things we worked on before. There has been some quite serious engineering in that direction, and it will be built. The problem for now is that any public highway only becomes cheap after you have a lot of traffic on it. So this technology has to get over this first bump, which is not easy. I would say it would take a hundred years to have it in the vicinity of the earth. As with any apparatus of this kind, you have to have growth which is very slow for quite a long time, and then it will be much faster as it becomes cheaper. Much like airplanes, which were just toys for the rich in the early times, and became cheaper when they were developed as weapons, and then became the public highways we have today.

GB: It seems to me that space travel, at least in films and the collective imagination, is always thought of in terms of our coming back to Earth. The type of speculations that you have written seem on the contrary to invite a type of travel and exploration where there is no coming back. Could you elaborate on this distinction?

FD: Yes, for me there are two different ways of exploring: the Atlantic and the Pacific. They are really quite opposite. In the Atlantic type of exploring, you have someone like Columbus and his ships and the idea that he would get to China and then come home again. The whole idea was to make a big voyage to some place and then come back. That was his plan, and that's what he did. It just happened to be America instead of China but the system was nonetheless some kind of top-down exploring. Going and coming back. In the Pacific type, you had Polynesians going with their canoes with no interest whatsoever in coming back. They wanted to find places to live in. And they did find

islands: they found New Zealand, they found Hawaii, and went on and on as far as they could without any idea of arriving at South America, as this type of goal wasn't the point at all. Anyhow, in terms of space travel I would like the Pacific model much better because they were not linked to any limited object; they would just go further, and their children would go further in a process that has no end.



Winter circulation of currents in the Pacific Ocean (In "We the Navigators" David Lewis, Australian University Press, 1975)

By the way, did you ever read Kenneth Brower?[4] Kenneth Brower actually worked with the people in Polynesia. He organized a voyage using ancient Polynesian technology so they had a big canoe and sailed using only the Polynesian methods. They sailed from Hawaii to New Zealand, and he wrote books about this, giving a precise account of their navigation techniques. It is quite astonishing how well they can navigate; simply by following the birds and studying the patterns of waves on the ocean they are able to determine the location of islands which are quite far away. So it was in no way by random chance that they found these islands; they knew how to find islands.

GB: When thinking of space travel, what are these tricks we can use for ourselves? What is the outer-space equivalent of birds and patterns of waves in the Pacific?

FD: Warmth happens to be something we are very sensitive to; we can detect it from very far away, and our instruments are amazingly good. Anything warm of course produces radiation, so we can detect a planet certainly from a long distance away. But for the smaller objects that are cold, it is not so easy, and as I said "pit lamping" doesn't work so well because it goes with the inverse fourth power of distance. So it is not good for long distances. So that is really an unsolved problem for now.

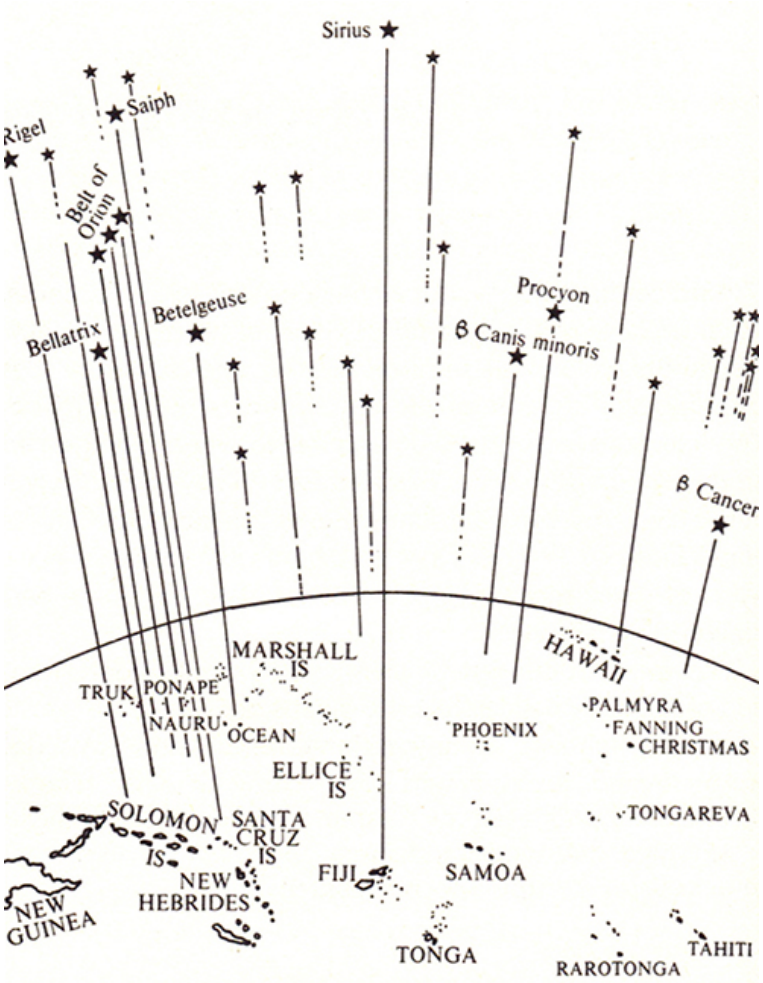
GB: How would such a process of drifting through space influence our evolution as a species?

FD: The point is that it is life as a whole that is moving out—not just humans. Life is of course always changing and every species has a choice: either you go extinct or you diversify, become many species. That has always happened. It doesn't just stay the same. Undoubtedly, as humans spread out in space, either we will become extinct or we will become a hundred species, a million species. That's the way life works.

GB: Could it be that life itself would change in such a drastic way that it would become fully unrecognizable as life?

FD: That is possible if we spread out in space, but on this planet, life has stayed remarkably constant for most of the three or four billion years. The structure of a living cell has changed very little. Most of the essential features were there from the beginning so I don't know whether that will change or not, but certainly what has happened in the last three billion years is that the arrangements of cells of course have changed, but the cells themselves have not changed much. So I would not expect any radical change here, but it could happen.

GB: Recently, you have made some strong critical claims about what you see as the failure of artificial intelligence over the past sixty years of AI research. Your argument is mostly aimed at the inadequacy of the models of intelligence we use in such projects. Following from what you just said, it seems that the type of intelligence you are talking about is an intelligence embedded in a process of ongoing departure and navigation—a migrant intelligence of some sort.



Zenith star passing over Fiji (In We, the Navigators. David Lewis, Australian University Press, 1975)

FD: It is true. As humans we started in Africa and lived in a certain pattern, and after we moved out and came to the North, particularly East-Asia and Europe, the conditions for life were much more harsh. Europe was half covered with ice and humans had to stay alive, learning to keep warm and managing to coexist in caves. That undoubtedly stimulated a different kind of intelligence. Surviving in such conditions required a very high degree of collaboration and the ability to change our habits very quickly. These drastic changes resulted in different kinds of people and societies. This is certainly also true for the future of life in space.

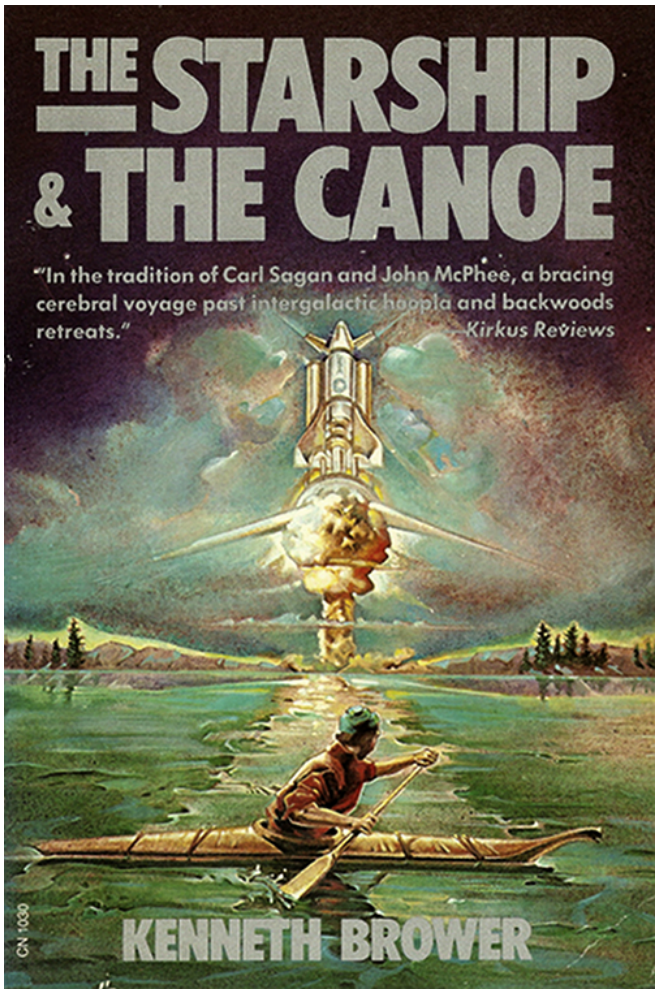
GB: Are you calling for a “Pacific” type of model for intelligence?

FD: What we will certainly learn from the Keppler mission is that there are billions of planets in our own galaxies, many of them not attached to stars. There are billions of planets and even trillions of small objects floating free in the galaxy, so as we move out in space in a “Pacific” way of traveling, we won’t have to go from star to star, as they are many places in between where we can stop. The point is that if we have a billion different

habitats where life can be established, and every place with its own evolution, this will result in a huge variety of ways of living, and most certainly in very different kinds of intelligence.

GB: Regarding the artificial intelligence we are now actually trying to build, can you explain more precisely why you think it is a failure?

FD: Well, merely because we are using digital machines, and these machines are designed for a different purpose. They are good at doing numerical calculations and to do so they have to reduce everything to 0 and 1. That's not the way a brain works. If you look at your own brain, as far as I can tell, you see images, pictures, which come and go very fast. You can immediately recognize a face or a voice. These patterns of sound and light can actually be recognized directly by our brain and I don't believe we are dividing them into 0s and 1s. It certainly works for language because it can be discretized, just as babies have the ability to reduce speech into phonemes. But the human brain doesn't just recognize syllables, it recognizes sentences and ideas. When we are listening to speech we listen to the whole sentence, which is immediately translated into meaning. That's clearly something a digital machine is not good at.



Cover of Kenth Brower's The Starship & The Canoe (Harper & Row. 1978)

GB: Finally, there seems to be a consensus today around preservation of the conditions of life on this planet, some might say a kind of ecological conservatism. I think you are quite opposed to such views, can you explain why?

FD: Well, I think it probably comes from being a child in England in the thirties. If you look at England as it now exists, it is heavily populated and there are all kinds of ugly buildings and ugly disturbances, but somehow it is still a beautiful landscape. It is still a lovely place for humans to walk around, and that's the environment I grew up with. Even though it is all artificial, I feel it has a great beauty to it. Nothing which is there was there ten thousand years ago. Ten thousand years ago, it was nothing but forests, what we now call wilderness, but I think it was much less interesting than the modern landscape, which is of course far more diverse and rich. Modern landscapes have forests, farms, grasslands, in great variety—some of it natural, some of it artificial. In my view, it is

much more beautiful now than it was in its natural state. It is my also my feeling about the whole universe that it is sort of boring the way it is now. If you look at it, all the planets except this one are dead.

GB: So you mean it is our responsibility as humans to transform it?

FD: Yes.

Interview conducted for Glass Bead by Fabien Giraud.

Footnotes

1. Freeman Dyson. “Search for Artificial Stellar Sources of Infrared Radiation” *Science* 131.3414 (June 1960): 1667-1668. Print.

2. Olaf Stapleton. *Star Maker*. London: Methuen Publishing Ltd, 1937. Print.

3. Freeman Dyson. “Interstellar Transport.” *Physics Today* October 1968: 41-45. Print.

4. Kenneth Brower. *With Their Islands Around Them*. New York: Holt, Rinehart and Winston, 1974. Print.

Freeman Dyson’s most useful contribution to science was the unification of the three versions of quantum electrodynamics invented by Feynman, Schwinger and Tomonaga. He subsequently worked on nuclear reactors, solid state physics, ferromagnetism, astrophysics and biology, looking for problems where elegant mathematics could be usefully applied. He has written a number of books about science for the general public.

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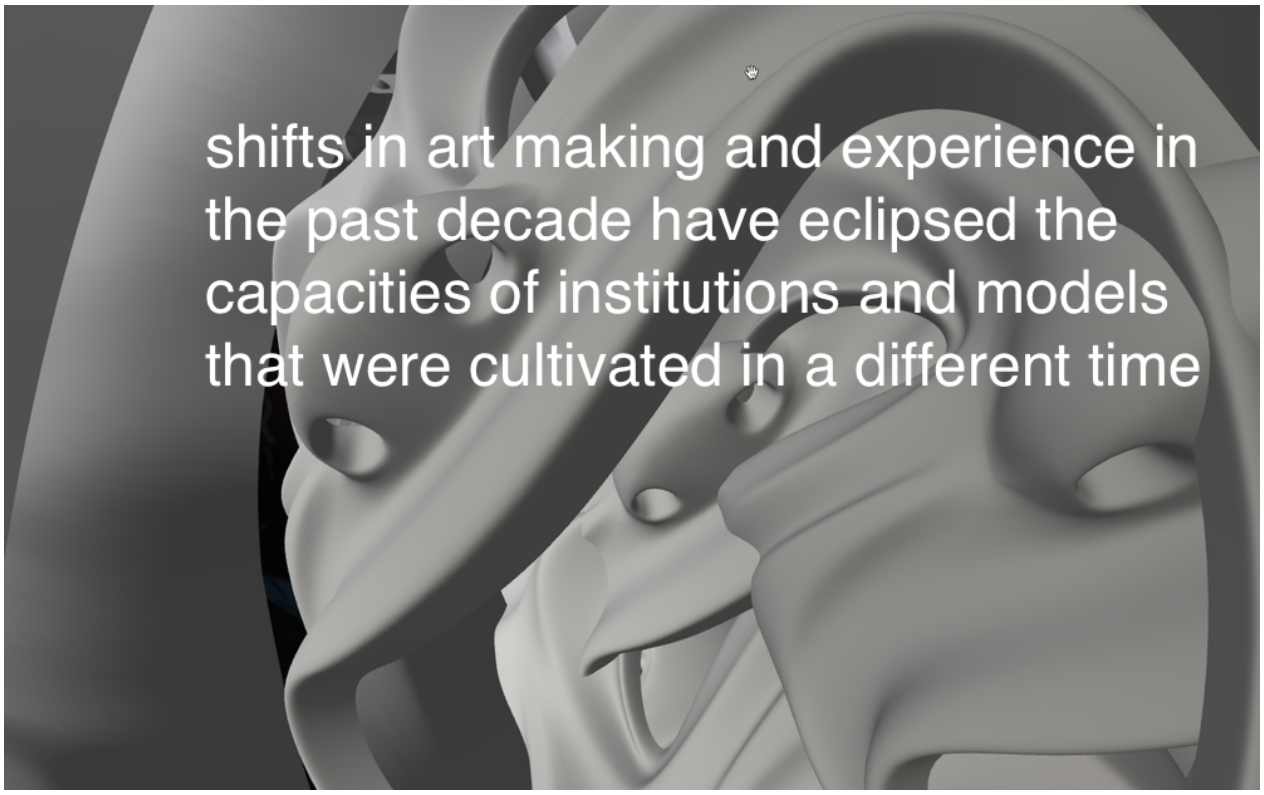
Re-Engineering Hegemony: Glass Bead in conversation with Mat Dryhurst, Holly Herndon and Alex Williams

Alex Williams,

Holly Herndon,

Mat Dryhurst

Music, unlike many other forms of art, has long been recognized to serve more than an ornamental or representative function. Plato acknowledged the capacity of music to 'mightily fasten' to the inward places of the soul.[1] Studies in evolutionary musicology have investigated how music may have served as the basis for social cohesion in early hominids groups, and some have argued that this was a necessary factor in the development of complex intelligence, the synchronized coordination of bodies and the expansion of memory and anticipation.[2] Jacques Attali further claimed that the changing form of music is a historical process, deeply bound up with the wider political economy, that not only expresses but is *prophetic* of future forms of social organization.[3] Singularly placed for elaborating the efficacy of music in this regard, we invited Holly Herndon, Mat Dryhurst, and Alex Williams to discuss with us their shared cross-disciplinary interest in speculatively orienting art, technology, and politics toward the future.



Text overlaid on image created by Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

Glass Bead: It can be argued that contemporary art is characterized by a fetishization of indeterminacy, and that there have been parallel tendencies within music and sound art. This fetishization is problematic on a number of levels; it is complicit with neoliberal hegemony, it is generally anti-rationalist and offers no constructive orientation to the future. On the other hand, there has been a progressive expansion of the space of music, and a rational exploration of complex sound and noise. What do you think about the development of music with regard to these two perspectives and the polemics that underlie them?

Mat Dryhurst: To be frank, I feel at all levels that the game has changed and we are in a process of reconfiguration to try and catch up with it. We were just discussing how the ceremonial and archaic aspects of playing in the music world, or contemporary art world, feel to a degree like playacting. One has to acknowledge them to make a living and participate, however it is clear that we are perhaps a transitional generation, that shifts in art making and experience in the past decade have eclipsed the capacities of institutions and models that were cultivated in a different time and for a different function than is perhaps required today. It is also clear that the game has shifted in accordance with the neoliberal hegemony you describe, but we cannot wince at that, as it is too crucial.

It's one of the things, I think, that excites us most about the group of characters you could crudely describe as the left accelerationists—this idea of surveying emerging relations and shifting modes of power and attempting to modulate our activities to antagonize or exploit those new channels. We are obsessed with YouTube stars, not always for the quality of the work being made, but for how distant the rules of engagement are with anything that has existed previously in an arts context. I see most contemporary artists now as simply curators of phenomena that they have witnessed existing in the *real* cultural battlefield—snippets of something happening in Eastern Europe, a font from here, a reference to an obscure YouTube trend from kids with cell phones in Chicago. This is an indeterminate, prostrate state—one that normally ends in a conclusion of "IDK WTF to do. There is just too much, but this looks nice."

The challenge is to not simply observe this world from the outside, and congratulate ourselves for the conversations we follow, but to *participate* within that culture and exercise some of the ideas and models we believe in within an arena that has legitimate impact. This is really hard, but ought to be the goal. The great opportunity, as you described, is that this new environment is pretty open to things that traditionally may have been marginalized—Metahaven and others have talked about how comedy, for example, *won the web.*[4]—and in a sense this new landscape favors sharp minds with the ability to produce work quickly and pointedly—which is why I find Ben Singleton's works on *Metis*[5] and the introduction of Francois Jullien's *Treatise on Efficacy*[6] to be so essential. It's also part of the motivation behind my Saga project,[7] which prioritizes time and context specific expression (a comedic trait) and also the need for us to begin to start dealing with the new era of personalization that has been ushered in by a web driven by advertising and the desire to target us as individuals.

I did a talk for PAN a couple of years ago, speaking of the need to appreciate micro gestures online, as allegro (alacritous) notes in one unfurling composition, and think that there is merit to reconfiguring our appreciation of art production in this new climate through such a logic. Models exist to facilitate such a shift; we just kind of need collective will to start participating within them. Which isn't to say there isn't merit in utilizing old industry. There is a lot of good will around the music industry, for example, and a lot of knowledge that can be repurposed towards new ends, but I'd rather see these institutions as modules in a larger project.

Holly Herndon: There is sometimes a strange false dichotomy in musical discourse between the rational and emotional. I find this particularly frustrating because I try to make work that deals with both. There's a tendency in music to rely on emotional tropes,

particular vocal inflections, instrumentation, swelling, or chord progressions, to express a depth of emotion. While I of course also draw on a shared musical language, I'm more interested in developing new motifs to express new emotions, which are usually directly tied to the underlying concept of a work. Mat and I develop musical processes that deal with the subject matter of the piece, tying in production, text and delivery. This to me is both more conceptually and rationally sound, as well as more emotional.

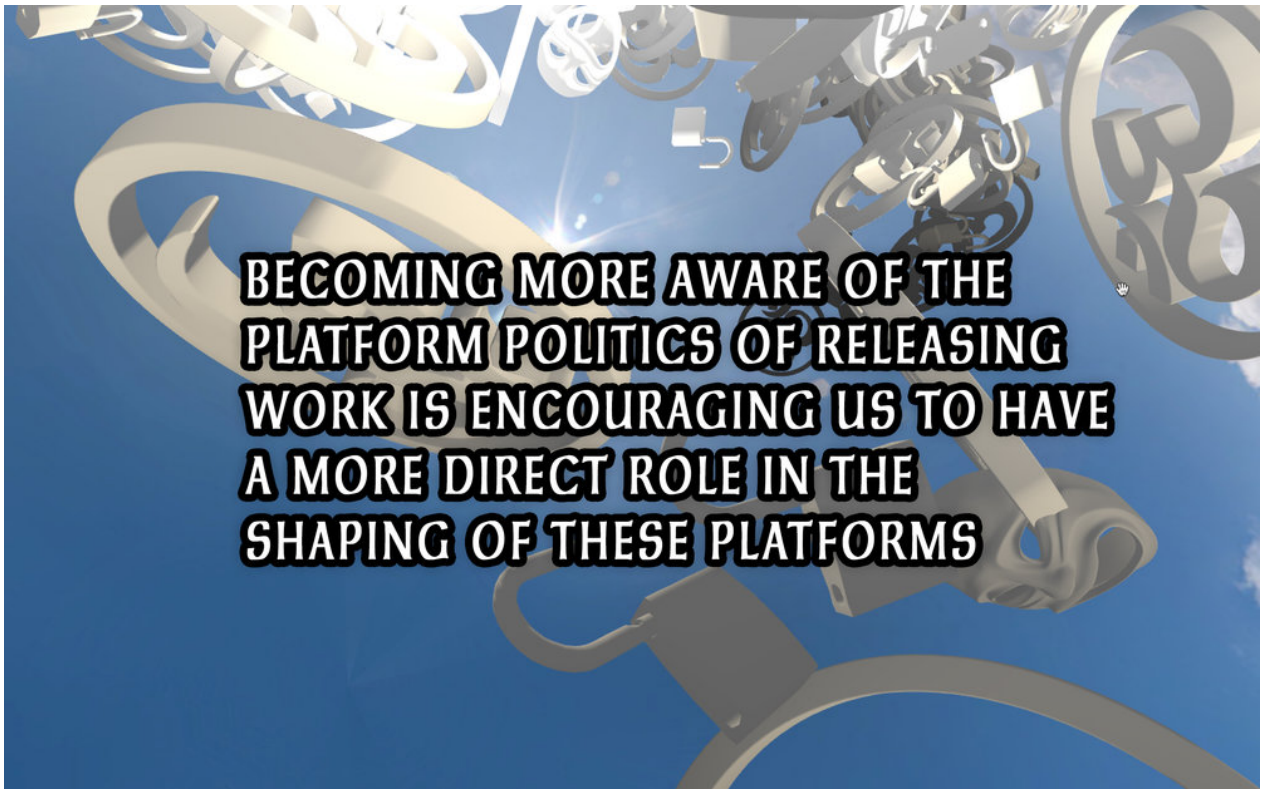
Alex Williams: Matt and I discussed online a little while back the fetishization of indeterminacy in the guise of a sort of complexity porn. This is something that interests me in a number of registers: aesthetic, yes, but also theoretical, scientific, and political. There is an entire meta-ideological strand of thinking, from political theory through to contemporary art practice, that lauds the 'creativity' of being itself in ultimately indeterminate complex processes. This is either a sort of shock and awe aesthetic of the irretrievably intricate, or a 'lava lamp liberalism' of neovitalist animistic wonder. They slot in, as you state in your question, quite snugly into some of the fundamental intellectual beliefs of neoliberalism—principally Hayek's idea of spontaneous and unplannable order.

What I am interested in, in art as well as in politics, are those approaches that can mediate between irreducible epistemological complexity (where the world is too complex to ever understand, 'master,' or manipulate) and older discourses of absolute understanding and control (i.e., Laplace). Put much more simply, the world and its phenomena *are* complex, but not purely indeterminate. To act in such a world requires us to understand the patterns that are formed, even in highly complex domains. For art, even if the original work itself is rigorously indeterminate, our pattern-locating mentalities will tend towards projecting patterns onto them. Suffice to say, however, the best (academic?) music today combines a formal complexity with an overarching aesthetic design. At its best, this matches a compositional complexity with the sensory register, enabling us to 'hear' the process, albeit often processes very different from traditional western harmonic resolution, and hence to find order within the complex.

HH: This speaks a little to what I mentioned above in tying process to concept, which is of course much more possible when dealing with electronic media—i.e., a song about surveillance can include self surveillance software, etc. When successful, the very sound or aesthetic of the piece can convey the idea.

If we think of the container, as the form of the piece, it holds smaller complex cells with complex relationships to the other cells. A sharp ear could be able to recognize these relationships and gain an aesthetic experience from that understanding. The problem is

that in certain communities not all dialog is considered valid, and I personally think that the definition of those cells should expand. For example, the politics of choosing a specific drum pattern with a specific drum kit; this is a dialog within dance music communities, which would not be placed on the same level as the dialog of timbre and pitch class in academic circles.
I'm particularly interested in the pop music container, because it can act as a sort of Trojan horse, to borrow from my friend Benedict Singleton. Using custom and experimental software, I can create complex timbral shifts and rhythmic inflections, or cover political ground, but also participate in a shared cultural dialog that is happening outside of niche music communities. This is the sweet spot.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: Holly, you have an album named *Platform* after Benedict Singleton's theories about the strategic operationalization of contingency, and Mat, as well as your collaborative work with Holly you've designed an embeddable platform for self-hosted, website-specific artworks (called Saga) and talked about platforms in terms of the political economy of music in the digital age. Alex the concept of repurposing has played

an important part in your thinking, and you've recently written about the politics of platform dynamics. How can the logic of platforms be usefully applied to music, both at the level of aesthetics and politically speaking?

AW: Platform logic, if it can be reduced to a singular idea, is a matter of generative entrenchment. This is the philosopher William Wimsatt's term for a basic feature of complex adaptive systems of all kinds: they feature building blocks that operate as relatively stable platforms for other entities to build upon, and in doing so, in generating the behavior and structural possibilities of other entities, they become entrenched, hard to shift.[8] Generativity and entrenchment are therefore deeply coupled together. The more generative something is, the more difficult, or costly, it will be to shift or transform. This is, if you like, the basic diagram of the platform.

Music, at multiple levels, displays platform logic. Think of something like genre, for example. In dance music, genre is most often constructed around some basic conventions (BPM, beat structure, instrumentation choice). This generic setup is most powerful when it is capable of operating as a flexible platform for multiple different realizations—for example, the basic four-to-the-floor house and techno beat structure is incredibly simple, yet supports a vast array of different aesthetic realizations in practice. Alternatively, we could think of certain forms of tuning and pitch systems, and the way they operate as an invisible ground for much music-making practices. So the logic of platforms is already at work in basically all forms of music making.

The political side of platforms, as I understand it, comes in the way they recede into the background. They are literally fundamental, in the sense of being the ground on which practice occurs, yet successful platforms have a tendency to appear merely neutral. In this sense, they can control and guide action occurring atop them. In terms of IT platforms, the license to print money which Microsoft, for example, obtained in the nineties with Windows, was entirely about its ability to function as a smooth, apparently neutral platform environment. In the business studies literature on platforms, the ability to present yourself as a neutral space is deemed extremely important.

Beyond a certain tipping point, platforms become difficult not to use. All this means that power, and a conservative form of power at that, is deeply involved in platforms within the human world. But I think it is also important to emphasize that the reason platforms become successful is partly because they enable you to do things; they are productive, generative. Those seeking to oppose a given platform—a technical one, like Microsoft, Google, or Apple, or a political one, like Neoliberalism, or an aesthetic one, like conservative genre boundaries or tuning systems—have to remember that. It implies that

a purely negative or transgressive project will be unlikely to be able to seriously disrupt the functioning of existing malignant platforms. Only the building of new, better ones, will suffice. Or perhaps the re-engineering of those already in existence.

MD: I totally agree with Alex's point about musical convention as platform, and that is something Holly has spoken of a lot in the past; you basically have an entrenched language with which to express yourself as liberally as you can. I also think we see eye to eye about the need to re-engineer existing platforms such as the music industry, which I touched on a little bit before. One addition to this, I would say, would be the studying of social platforms that have always existed but perhaps have only been acknowledged since the advent of social media.

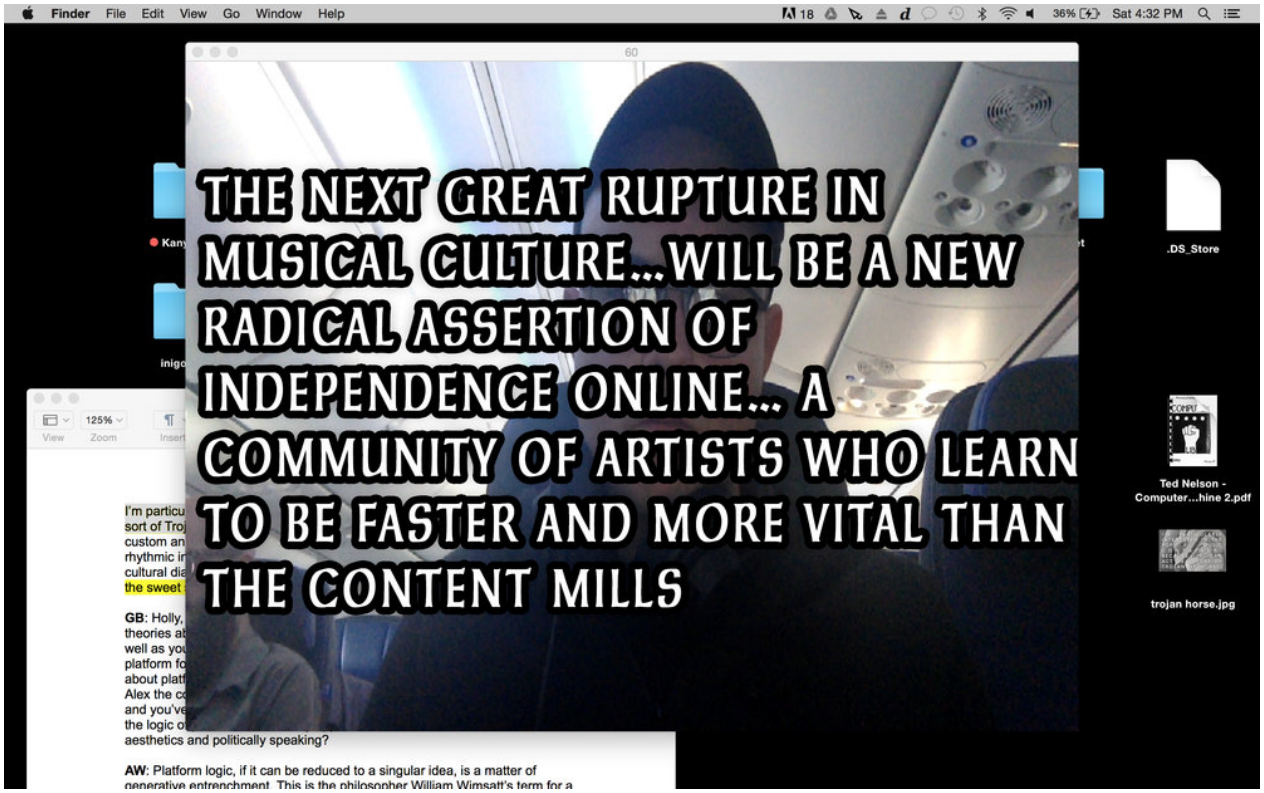
Art History, or Musicology, is often quite poor at identifying the idiosyncratic social elements that led to many of the canonized milestones of the evolution of the medium, the webs of influence, finance and opportunity. There is a reason we know who John Cage is, less so Harry Partch. I remember Holly writing a paper about Mary Bauermeister once, whose money and social circle contributed so greatly to Stockhausen's career and thinking—and without being too conspiratorial I believe there is real promise in understanding how these cultures were formed, with less emphasis on the icon and more emphasis on the platform that made the rupture possible. That was one of the goals with the ongoing *Platform* project, to emphasize the web of actors who contributed to its construction as a way of addressing that opportunity.

I remember being really struck by Reza Negarestani's mentioning of *Taqqiyah* in Cyclonopedia,[9] this idea of dispersed satellite agents, waiting to be activated, which also parallels the most promising aspects of John Perry Barlow's 'A Declaration of the Independence of Cyberspace'[10] which featured quite heavily in the track 'Interference.' These kind of social platforms exist in all aspects of society—platforms of wealth and influence determined by family names, platforms of favor determined by affiliation to institutions.

How can we learn from those models to construct social platforms with more virtuous/tricky aspirations? Is there a core ethos with the flexibility to sustain the generativity Alex speaks of and actually be productive? It might seem ambitious but I think we can learn a lot from how the independent musical infrastructure was developed out of necessity and conviction in the eighties and nineties, which is something I'm preparing a presentation about this month, incidentally.

HH: We were interested in seeing the release of an album as a platform with certain mechanisms that may be experimented within. So much of this is dictated by industry. Really mundane things like brand recognition, etc. play a big role in how music is discussed, praising the lone icon. We tried to subvert this with the interviews and press surrounding *Platform*, asking how we can keep enough name recognition so that the work is sharable and infectious, but use the platform to highlight other people's research. Depending on the journalist, it was more or less successful. The same goes for performance, travel, etc. It has helped me to open up experimentation beyond the software or sounds alone, and this is really exciting, as sound is so often quite abstract. Becoming more aware of the platform politics of releasing work is encouraging us to have a more direct role in the shaping of these platforms, to see them as malleable and to view ourselves with agency.

Electronic music, a field where I spend a lot of time, is obsessed with aestheticizing dystopia; it sounds cool, it works in a dark club, etc. Don't get me wrong, I love a good dystopian catharsis too, but I see a need for that to be balanced with a feeling of empowerment and encouragement. Independent music has long been a place where communities feel emboldened to take on infrastructural issues. This is where we are trying to take the conversation in music.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: In Hesse's *Glass Bead Game,* the leading academics played a game of knowledge synthesis in which musical motifs, philosophical propositions and scientific equations are equally represented by patterned placements of beads. This fantasy presents an ideal unification of knowledge, but various developments occurring after Hesse's book certainly make transits and syntheses between different domains possible: in particular category theory and complexity theory but also computational modeling to some degree. How does your own theory and practice of music relate to the notion of universal synthesis allegorized in Hesse's game?

MD: I think it's an interesting analogy for what you guys are trying to do, and somewhat haphazardly what I think we have been trying to do. I did an interview a while back talking about how frustrating I find it that many people in the art world harbor this bias that once something *does something*, it's no longer considered art. In many ways I feel that is a really limited perspective, cultivated at a time when people did not have such immediate access to one another. It's hard to quantify, but there is a large community of curious (in both senses of the word) people in different fields who are all finding each other online, and this synthesis is occurring at greater frequency. It's the only area I want to operate in.

Perhaps this synthesis is already happening, and teenagers now are slightly confused at the distinction between fields and people's dogged identification with one or the other. Music is one way to participate in a synthesis of sorts, but everything we do is pluggable and gestures are not contained to one area or one purpose. The album is a Trojan horse for other elements. The live show is a gathering place and a performance. We just participated in a conference that began as a slack group. It is one thing to aestheticize this synthesis, which a lot of people have attempted to do in the past, and quite the other to embody this synthesis and take advantage of opportunities not previously available. It's something we talk a lot about, how there is a regrettable focus on novelty, awe and spectacle within both arts and technology; "It's like a sculpture, but *the internet!*" or "We made this building look like it was constructed from 16 million ants! Look at all the moving lines!" And in a sense this seems quite antiquated—when the real exciting areas of progress for me are the ways in which people have adopted quite simple, ubiquitous technologies and grown cultures from those new interactions and connections. That's why the live text stuff we do for the show is, in my mind, far more interesting a proposition, as it is an experiment in data mining, real time communication, and real time broadcasting that is triggered simply from checking Facebook and using text edit.

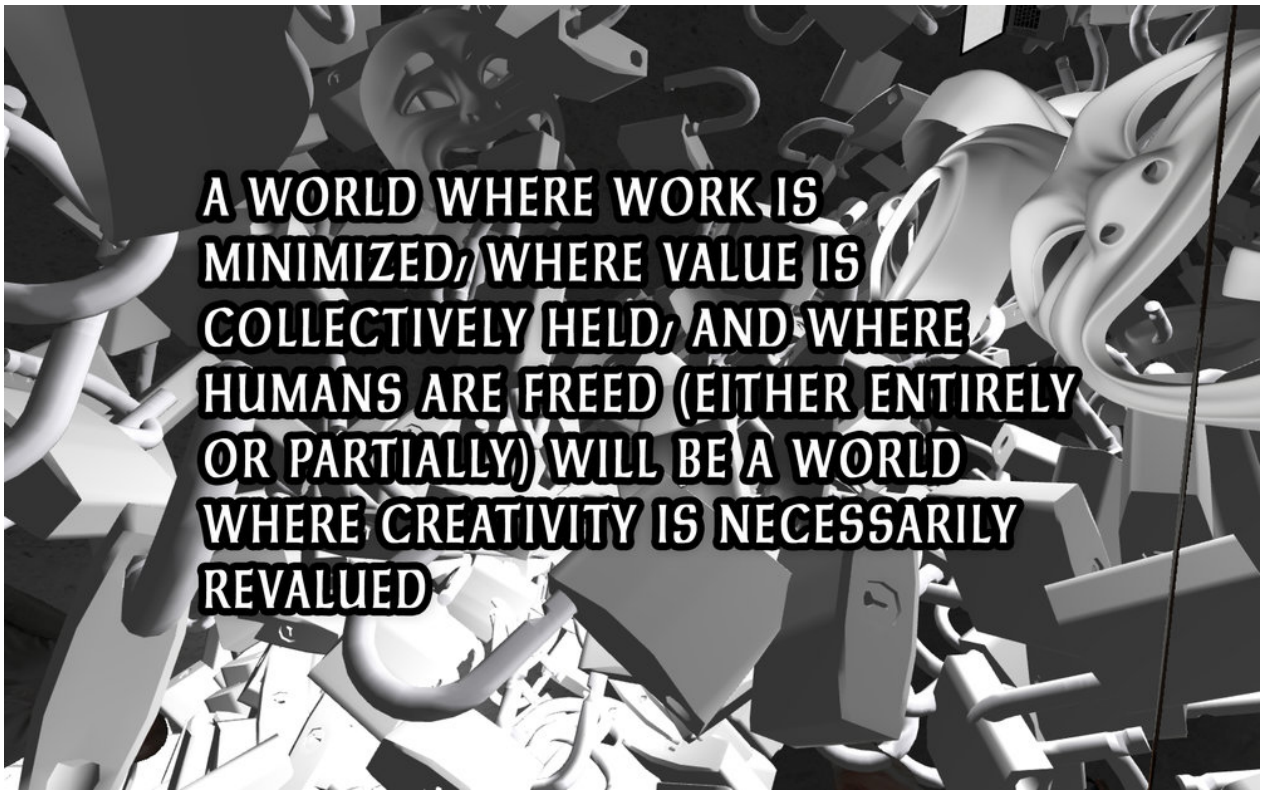
Those kinds of experiments don't position artists as people pawing at the window of culture, as detached curators of phenomena they witness online, or assuming some kind of removed, constructed stance, but as figures participating within a culture.

HH: It's a really lovely allegory. I've been fortunate to be involved with some institutions that take similar view, such as CCRMA or IRCAM. These are computer music research institutions where composers are seen as researchers who add value to the research progress. This requires a great deal of respect and humility on both sides, and when successful can yield amazing results.

GB: Alex, what are the political stakes of knowledge syntheses?

AW: In short, extremely significant. To summarize brutally, if politics is basically about power, and about how we can strategize within power relations, then the constitution of those power relations and our understanding thereof is key. But there is no simple, unitary way to understand all the ways that power is ramified, which means that any serious project to try and comprehend them is necessarily a highly synthetic one, expanding from the analysis of language to technology, energy networks, political organizations, economic systems, cultural production, identity and subjectivity, and so on. Mapping these formations and the complex interactions between them is a difficult task. Beyond that, there is the need to deal with the problem of complexity, which is based upon limitations of knowledge, and how to strategize on the basis of partial information.

I have proposed that something like *complex hegemony* can work as a conceptual container in which we can synthesize different forms of knowledge about power and the power of knowledge, while retaining local logics, or the fact that different fields of power organize themselves according to different rules and principles. Complex hegemony can then also work as a kind of technics (or macrophysics) of how power emerges out of the interactions of these distinct but overlapping domains or fields. This can then constitute a kind of strategic framework in which we can begin to conceptualize action, as necessarily always partial, revealing in the process of execution more knowledge as well as different capacities for action. Knowledge synthesis therefore underpins a kind of strategic synthesis of action, in a sense, ramified across domains, but with a quasi-intentional strategic orientation towards re-engineering power relations as a whole.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: Can you speculate on what a post-capitalist situation of music-making might be, or what might be some of the intermediary steps to its realization? Or, again this is both a political and aesthetic question: how can music reclaim the future?

HH: Just as the computer has freed me from playing each instrument individually and necessarily in real time, to shape other aspects of the music and vocal performance in real time, this will continue. In some cases it makes people lazy, and this creates boring, mechanical shows, but those who use that new freedom will create new forms of performance, i.e., if one parameter is automated, that means that you have the freedom to experiment with another parameter. Making music is becoming more like gaming, and almost anyone can participate, which is really exciting. This will change our ideas of virtuosity, and will open up entirely new conversations in a musical language that has been tied to five or six parameters for a very long time.

MD: I think music can reclaim the future by waking up and participating in its creation. I gave a talk a few years ago for PAN about an 'alacritous' music, that redefined itself by the logic of real time exchanges of information. It's also part of the logic behind the Saga project. We have found enough ways to create and exchange waveforms. I find that pursuit quite boring. The exchange of time and context specific gestures is at a premium, and I think finding a way to participate and complicate those exchanges is of paramount

importance.

I also think that algorithmic music is a distraction. What I cherish about music's power is its humanity and *live-ness*. I have said for some time that I think the next great rupture in musical culture (equivalent to the establishment of the independent distribution systems of the eighties and nineties) will be a new radical assertion of independence online—not a hermetic retreat, but a community of artists who learn to be faster and more vital than the content mills; artists who self-host and experiment with the means of dissemination so as to make the waveform economy look geriatric. I see traces of it happening and get very excited to think about what it might turn into with the right momentum.

AW: Thinking about algorithmic music–we've all heard and been disappointed by the sheer blandness of many attempts—but I'm not sure that this is some kind of human deficit, so much as the deficit in creative acumen of those crafting the algorithms themselves, which are in a sense merely another order of automation within the creative process, on top of existing processes of standardization (generic convention) or formalization (as in serialism and onwards in the 'classical' tradition).

In the book I've just written with Nick Srnicek, *Inventing the Future*, we discuss the ways in which left politics can be reoriented around a specific future trajectory: the struggle for a post-work society, which uses automation to liberate everyone from the drudgery, misery, and boredom of work. I don't think, however, that in the domain of culture this means, necessarily, a shift towards nonhuman creativity, per se. Instead, a world where work is minimized, where value is collectively held, and where humans are freed (either entirely or partially) will be a world where creativity is necessarily revalued. This will be as big a shift in the production, dissemination, and consumption of music as the invention of recorded sound, with highly unpredictable effects.

As to the role of music-making in post-capitalist society, this is obviously a matter of total speculation. There has been a strand of socio-musical theorizing (for example, Attali) which would point to the future of music as being one where we all compose, using technology to help mediate the way. In this sense, automation doesn't necessarily replace human creativity, but rather augments it, and potentially universalizes it.

Interview conducted for Glass Bead by Inigo Wilkins.

Footnotes

1. Plato. *The Republic*. Penguin Classics, 2007. Print.

2. Steven Mithen. *The Singing Neanderthals: the Origins of Music, Language, Mind and Body.* Harvard University Press. 2006.

3. Jacques Attali. *Noise: A Political Economy of Music. University of Minnesota Press*. 1985. Print.

4. Giampaolo Bianconi. "An Interview with Metahaven." *Rhizome*, February 2013. Web.

5. Benedict Singleton, "(Notes Toward) Speculative Design", *Shifter Magazine*. Web

6. François Jullien. *Traité de l'efficacité*. Le Livre de Poche, 2002. Print.

7. See http://accessions.org/article/saga-v1-0/ and https://github.com/matdryhurst/Saga#saga.

8. William Wimsatt. *Re-Engineering Philosophy for Limited Beings*. Harvard University Press, 2007. Print.

9. Reza Negarestani. *Cyclonopedia: Complicity with Anonymous Materials*. Re.press, 2008. Print.

10. Online at https://projects.eff.org/~barlow/Declaration-Final.html.

Alex Williams is a political theorist.

Holly Herndon is an artist currently based in San Francisco, California.

Mat Dryhurst is a San Francisco-based artist, curator, and technologist who experiments with personal data.

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Xenofeminism: A Politics for Alienation

Laboria Cuboniks

ZERO

0x00 Ours is a world in vertigo. It is a world that swarms with technological mediation, interlacing our daily lives with abstraction, virtuality, and complexity. XF constructs a feminism adapted to these realities: a feminism of unprecedented cunning, scale, and vision; a future in which the realization of gender justice and feminist emancipation contribute to a universalist politics assembled from the needs of every human, regardless of race, ability, economic standing, or geographical position. No more futureless repetition on the treadmill of capital, no more submission to the drudgery of labour, productive and reproductive alike, no more reification of the given masked as critique. Our future requires depetrification. XF is not a bid for revolution, but a wager on the long game of history, demanding imagination, dexterity and persistence.

0x01 XF seizes alienation as an impetus to generate new worlds. We are all alienated – but have we ever been otherwise? It is through, and not despite, our alienated condition that we can free ourselves from the muck of immediacy. Freedom is not a given—and it's certainly not given by anything 'natural'. The construction of freedom involves not less but more alienation; alienation is the labour of freedom's construction. Nothing should be accepted as fixed, permanent, or 'given'—neither material conditions nor social forms. XF mutates, navigates and probes every horizon. Anyone who's been deemed 'unnatural' in the face of reigning biological norms, anyone who's experienced injustices wrought in the name of natural order, will realize that the glorification of 'nature' has nothing to offer us—the queer and trans among us, the differently-abled, as well as those who have suffered discrimination due to pregnancy or duties connected to child-rearing. XF is vehemently anti-naturalist. Essentialist naturalism reeks of theology—the sooner it is exorcised, the better.

0x02 Why is there so little explicit, organized effort to repurpose technologies for progressive gender political ends? XF seeks to strategically deploy existing technologies to re-engineer the world. Serious risks are built into these tools; they are prone to imbalance, abuse, and exploitation of the weak. Rather than pretending to risk nothing, XF advocates the necessary assembly of techno-political interfaces responsive to these risks. Technology isn't inherently progressive. Its uses are fused with culture in a positive feedback loop that makes linear sequencing, prediction, and absolute caution impossible. Technoscientific innovation must be linked to a collective theoretical and political thinking in which women, queers, and the gender non-conforming play an unparalleled role.

0x03 The real emancipatory potential of technology remains unrealized. Fed by the market, its rapid growth is offset by bloat, and elegant innovation is surrendered to the buyer, whose stagnant world it decorates. Beyond the noisy clutter of commodified cruft, the ultimate task lies in engineering technologies to combat unequal access to reproductive and pharmacological tools, environmental cataclysm, economic instability, as well as dangerous forms of unpaid/underpaid labour. Gender inequality still characterizes the fields in which our technologies are conceived, built, and legislated for, while female workers in electronics (to name just one industry) perform some of the worst paid, monotonous and debilitating labour. Such injustice demands structural, machinic and ideological correction.

0x04 Xenofeminism is a rationalism. To claim that reason or rationality is 'by nature' a patriarchal enterprise is to concede defeat. It is true that the canonical 'history of thought' is dominated by men, and it is male hands we see throttling existing institutions of science and technology. But this is precisely why *feminism must be a rationalism*—because of this miserable imbalance, and not despite it. There is no 'feminine' rationality, nor is there a 'masculine' one. Science is not an expression but a suspension of gender. If today it is dominated by masculine egos, then it is at odds with itself— and this contradiction can be leveraged. Reason, like information, wants to be free, and patriarchy cannot give it freedom. *Rationalism must itself be a feminism*. XF marks the point where these claims intersect in a two-way dependency. It names reason as an engine of feminist emancipation, and declares the right of everyone to speak as no one in particular.

INTERRUPT

0x05 The excess of modesty in feminist agendas of recent decades is not proportionate to the monstrous complexity of our reality, a reality cross-hatched with fibre-optic cables, radio and microwaves, oil and gas pipelines, aerial and shipping routes, and the unrelenting, simultaneous execution of millions of communication protocols with every passing millisecond. Systematic thinking and structural analysis have largely fallen by the wayside in favour of admirable, but insufficient struggles, bound to fixed localities and fragmented insurrections. Whilst capitalism is understood as a complex and ever-expanding totality, many would-be emancipatory anti-capitalist projects remain profoundly fearful of transitioning to the universal, resisting big-picture speculative politics by condemning them as necessarily oppressive vectors. Such a false guarantee treats universals as absolute, generating a debilitating disjuncture between the thing we seek to depose and the strategies we advance to depose it.

0x06 Global complexity opens us to urgent cognitive and ethical demands. These are Promethean responsibilities that cannot pass unaddressed. Much of twenty-first century feminism—from the remnants of postmodern identity politics to large swathes of contemporary ecofeminism—struggles to adequately address these challenges in a manner capable of producing substantial and enduring change. Xenofeminism endeavours to face up to these obligations as collective agents capable of transitioning between multiple levels of political, material and conceptual organization.

0x07 We are adamantly synthetic, unsatisfied by analysis alone. XF urges constructive oscillation between description and prescription to mobilize the recursive potential of contemporary technologies upon gender, sexuality and disparities of power. Given that there are a range of gendered challenges specifically relating to life in a digital age—from sexual harassment via social media, to doxxing, privacy, and the protection of online images—the situation requires a feminism at ease with computation. Today, it is imperative that we develop an ideological infrastructure that both sup- ports and facilitates feminist interventions within connective, networked elements of the contemporary world. Xenofeminism is about more than digital self-defence and freedom from patriarchal networks. We want to cultivate the exercise of positive freedom—freedom-to rather than simply freedom-from—and urge feminists to equip themselves with the skills to redeploy existing technologies and invent novel cognitive and material tools in the service of common ends.
0x08 The radical opportunities afforded by developing (and alienating) forms of technological mediation should no longer be put to use in the exclusive interests of capital, which, by design, only benefits the few. There are incessantly proliferating tools to be annexed, and although no one can claim their comprehensive accessibility, digital tools have never been more widely available or more sensitive to appropriation than they are today. This is not an elision of the fact that a large amount of the world's poor is adversely affected by the expanding technological industry (from factory workers labouring under abominable conditions to the Ghanaian villages that have become a repository for the e-waste of the global powers) but an explicit acknowledgement of these conditions as a target for elimination. Just as the invention of the stock market was also the invention of the crash, Xenofeminism knows that technological innovation must equally anticipate its systemic condition responsively.

TRAP

0x09 XF rejects illusion and melancholy as political inhibitors. Illusion, as the blind presumption that the weak can prevail over the strong with no strategic coordination, leads to unfulfilled promises and unmarshalled drives. This is a politics that, in wanting so much, ends up building so little. Without the labour of large-scale, collective social organisation, declaring one's desire for global change is nothing more than wishful thinking. On the other hand, melancholy—so endemic to the left—teaches us that emancipation is an extinct species to be wept over and that blips of negation are the best we can hope for. At its worst, such an attitude generates nothing but political lassitude,

and at its best, installs an atmosphere of pervasive despair which too often degenerates into factionalism and petty moralizing. The malady of melancholia only compounds political inertia, and—under the guise of being realistic—relinquishes all hope of calibrating the world otherwise. It is against such maladies that XF innoculates.

0x0A We take politics that exclusively valorize the local in the guise of subverting currents of global abstraction, to be insufficient. To secede from or dis- avow capitalist machinery will not make it disappear. Likewise, suggestions to pull the lever on the emergency brake of embedded velocities, the call to slow down and scale back, is a possibility available only to the few—a violent particularity of exclusivity—ultimately entailing catastrophe for the many. Refusing to think beyond the microcommunity, to foster connections between fractured insurgencies, to consider how emancipatory tactics can be scaled up for universal implementation, is to remain satisfied with temporary and defensive gestures. XF is an affirmative creature on the offensive, fiercely insisting on the possibility of large-scale social change for all of our alien kin.

0x0B A sense of the world's volatility and artificiality seems to have faded from contemporary queer and feminist politics, in favour of a plural but static constellation of gender identities, in whose bleak light equations of the good and the natural are stubbornly restored. While having (perhaps) admirably expanded thresholds of 'tolerance', too often we are told to seek solace in unfreedom, staking claims on being 'born' this way, as if offering an excuse with nature's blessing. All the while, the heteronormative centre chugs on. XF challenges this centrifugal referent, knowing full well that sex and gender are exemplary of the fulcrum between norm and fact, between freedom and compulsion. To tilt the fulcrum in the direction of nature is a defensive concession at best, and a retreat from what makes trans and queer politics more than just a lobby: that it is an arduous assertion of freedom against an order that seemed immutable. Like every myth of the given, a stable foundation is fabulated for a real world of chaos, violence, and doubt. The 'given' is sequestered into the private realm as a certainty, whilst retreating on fronts of public consequences. When the possibility of transition became real and known, the tomb under Nature's shrine cracked, and new histories—bristling with futures—escaped the old order of 'sex'. The disciplinary grid of gender is in no small part an attempt to mend that shattered foundation, and tame the lives that escaped it. The time has now come to tear down this shrine entirely, and not bow down before it in a piteous apology for what little autonomy has been won.

0x0C If 'cyberspace' once offered the promise of escaping the strictures of essentialist identity categories, the climate of contemporary social media has swung forcefully in the other direction, and has become a theatre where these prostrations to identity are performed. With these curatorial practices come puritanical rituals of moral maintenance, and these stages are too often overrun with the disavowed pleasures of accusation, sham- ing, and denunciation. Valuable platforms for connection, organization, and skill-sharing become clogged with obstacles to productive debate positioned as if they are debate. These puritanical politics of shame—which fetishize oppression as if it were a blessing, and cloud the waters in moralistic frenzies—leave us cold. We want neither clean hands nor beautiful souls, neither virtue nor terror. We want superior forms of corruption.

0x0D What this shows is that the task of engineering platforms for social emancipation and organization cannot ignore the cultural and semiotic mutations these platforms afford. What requires reengineering are the memetic parasites arousing and coordinating behaviours in ways occluded by their hosts' self-image; failing this, memes like 'anonymity', 'ethics', 'social justice' and 'privilege-checking' host social dynamisms at odds with the often-commendable intentions with which they're taken up. The task of collective self-mastery requires a hyperstitional manipulation of desire's puppet-strings, and deployment of semiotic operators over a terrain of highly networked cultural systems. The will will always be corrupted by the memes in which it traffics, but nothing prevents us from instrumentalizing this fact, and calibrating it in view of the ends it desires.

PARITY

0x0E Xenofeminism is gender-abolitionist. 'Gender abolitionism' is not code for the eradication of what are currently considered 'gendered' traits from the human population. Under patriarchy, such a project could only spell disaster—the notion of what is 'gendered' sticks disproportionately to the feminine. But even if this balance were redressed, we have no interest in seeing the sexuate diversity of the world reduced. Let a hundred sexes bloom! 'Gender abolitionism' is shorthand for the ambition to construct a society where traits currently assembled under the rubric of gender, no longer furnish a grid for the asymmetric operation of power. 'Race abolitionism' expands into a similar formula—that the struggle must continue until currently racialized characteristics are no more a basis of discrimination than than the color of one's eyes. Ultimately, every emancipatory abolitionism must incline towards the horizon of class abolitionism, since

it is in capitalism where we encounter oppression in its transparent, denaturalized form: you're not exploited or oppressed because you are a wage labourer or poor; you are a labourer or poor because you are exploited.

0x0F Xenofeminism understands that the viability of emancipatory abolitionist projects—the abolition of class, gender, and race—hinges on a profound reworking of the universal. The universal must be grasped as generic, which is to say, intersectional. Intersectionality is not the morcellation of collectives into a static fuzz of cross-referenced identities, but a political orientation that slices through every particular, refusing the crass pigeon- holing of bodies. This is not a universal that can be imposed from above, but built from the bottom up – or, better, laterally, opening new lines of transit across an uneven landscape. This non-absolute, generic universality must guard against the facile tendency of conflation with bloated, un- marked particulars—namely Eurocentric universalism—whereby the male is mistaken for the sexless, the white for raceless, the cis for the real, and so on. Absent such a universal, the abolition of class will remain a bourgeois fantasy, the abolition of race will remain a tacit white-supremacism, and the abolition of gender will remain a thinly veiled misogyny, even—especially—when prosecuted by avowed feminists themselves. (The absurd and reck- less spectacle of so many self-proclaimed 'gender abolitionists" campaign against trans women is proof enough of this).

0x10 From the postmoderns, we have learnt to burn the facades of the false universal and dispel such confusions; from the moderns, we have learnt to sift new universals from the ashes of the false. Xenofeminism seeks to construct a coalitional politics, a politics without the infection of purity. Wielding the universal requires thoughtful qualification and precise self- reflection so as to become a ready-to-hand tool for multiple political bodies and something that can be appropriated against the numerous oppressions that transect with gender and sexuality. The universal is no blueprint, and rather than dictate its uses in advance, we propose XF as a platform. The very process of construction is therefore understood to be a negentropic, iterative, and continual refashioning. Xenofeminism seeks to be a mutable architecture that, like open source software, remains available for perpetual modification and enhancement following the navigational impulse of militant ethical reasoning. Open, however, does not mean undirected. The most durable systems in the world owe their stability to the way they train order to emerge as an 'invisible hand' from apparent spontaneity; or exploit the inertia of investment and sedimentation. We should not hesitate to learn from our

adversaries or the successes and failures of history. With this in mind, XF seeks ways to seed an order that is equitable and just, injecting it into the geometry of freedoms these platforms afford.

ADJUST

0x11 Our lot is cast with technoscience, where nothing is so sacred that it cannot be reengineered and transformed so as to widen our aperture of freedom, extending to gender and the human. To say that nothing is sacred, that nothing is transcendent or protected from the will to know, to tinker and to hack, is to say that nothing is supernatural. 'Nature'— understood here, as the unbounded arena of science—is all there is. And so, in tearing down melancholy and illusion; the unambitious and the non-scaleable; the libidinized puritanism of certain online cultures, and Nature as an un-remakeable given, we find that our normative anti-naturalism has pushed us towards an unflinching ontological naturalism. There is nothing, we claim, that cannot be studied scientifically and manipulated technologically.

0x12 This does not mean that the distinction between the ontological and the normative, between fact and value, is simply cut and dried. The vectors of normative anti-naturalism and ontological naturalism span many ambivalent battlefields. The project of untangling what ought to be from what is, of dissociating freedom from fact, will from knowledge, is, indeed, an infinite task. There are many lacunae where desire confronts us with the brutality of fact, where beauty is indissociable from truth. Poetry, sex, technology and pain are incandescent with this tension we have traced. But give up on the task of revision, release the reins and slacken that tension, and these filaments instantly dim.

CARRY

0x13 The potential of early, text-based internet culture for countering repressive gender regimes, generating solidarity among marginalised groups, and creating new spaces for experimentation that ignited cyberfeminism in the nineties has clearly waned in the twenty-first century. The dominance of the visual in today's online interfaces has reinstated familiar modes of identity policing, power relations and gender norms in self-representation. But this does not mean that cyberfeminist sensibilities belong to the past. Sorting the subversive possibilities from the oppressive ones latent in today's web requires a feminism sensitive to the insidious return of old power structures, yet savvy enough to know how to exploit the potential. Digital technologies are not separable from the material realities that underwrite them; they are connected so that each can be used

to alter the other towards different ends. Rather than arguing for the primacy of the virtual over the material, or the material over the virtual, xenofeminism grasps points of power and powerlessness in both, to unfold this knowledge as effective interventions in our jointly composed reality.

0x14 Intervention in more obviously material hegemonies is just as crucial as intervention in digital and cultural ones. Changes to the built environment harbour some of the most significant possibilities in the reconfiguration of the horizons of women and queers. As the embodiment of ideological constellations, the production of space and the decisions we make for its organization are ultimately articulations about 'us' and reciprocally, how a 'we' can be articulated. With the potential to foreclose, restrict, or open up future social conditions, xenofeminists must become attuned to the language of architecture as a vocabulary for collective choreo-graphy—the coordinated writing of space.

0x15 From the street to the home, domestic space too must not escape our tentacles. So profoundly ingrained, domestic space has been deemed impossible to disembed, where the home as norm has been conflated with home as fact, as an un-remakeable given. Stultifying 'domestic realism' has no home on our horizon. Let us set sights on augmented homes of shared laboratories, of communal media and technical facilities. The home is ripe for spatial transformation as an integral component in any process of feminist futurity. But this cannot stop at the garden gates. We see too well that reinventions of family structure and domestic life are currently only possible at the cost of either withdrawing from the economic sphere—the way of the commune—or bearing its burdens manyfold—the way of the single parent. If we want to break the inertia that has kept the moribund figure of the nuclear family unit in place, which has stubbornly worked to isolate women from the public sphere, and men from the lives of their children, while penalizing those who stray from it, we must overhaul the material infrastructure and break the economic cycles that lock it in place. The task before us is twofold, and our vision necessarily stereoscopic: we must engineer an economy that liberates reproductive labour and family life, while building models of familiality free from the deadening grind of wage labour.

0x16 From the home to the body, the articulation of a proactive politics for biotechnical intervention and hormones presses. Hormones hack into gender systems possessing political scope extending beyond the aesthetic calibration of individual bodies. Thought structurally, the distribution of hormones—who or what this distribution prioritizes or pathologizes—is of paramount import. The rise of the internet and the hydra of black

mar- ket pharmacies it let loose—together with a publicly accessible archive of endocrinological knowhow—was instrumental in wresting control of the hormonal economy away from 'gatekeeping' institutions seeking to mitigate threats to established distributions of the sexual. To trade in the rule of bureaucrats for the market is, however, not a victory in itself. These tides need to rise higher. We ask whether the idiom of 'gender hacking' is extensible into a long-range strategy, a strategy for wetware akin to what hacker culture has already done for software—constructing an entire universe of free and open source platforms that is the closest thing to a practicable communism many of us have ever seen. Without the foolhardy endangerment of lives, can we stitch together the embryonic promises held before us by pharmaceutical 3D printing ('Reactionware'), grassroots telemedical abortion clinics, gender hacktivist and DIY-HRT forums, and so on, to assemble a platform for free and open source medicine?

0x17 From the global to the local, from the cloud to our bodies, xenofeminism avows the responsibility in constructing new institutions of technomaterialist hegemonic proportions. Like engineers who must conceive of a total structure as well as the molecular parts from which it is constructed, XF emphasises the importance of the mesopolitical sphere against the limited effectiveness of local gestures, creation of autonomous zones, and sheer horizontalism, just as it stands against transcendent, or top-down impositions of values and norms. The mesopolitical arena of xenofeminism's universalist ambitions comprehends itself as a mobile and intricate network of transits between these polarities. As pragmatists, we invite contamination as a mutational driver between such frontiers.

OVERFLOW

0x18 XF asserts that adapting our behaviour for an era of Promethean complexity is a labour requiring patience, but a ferocious patience at odds with 'waiting'. Calibrating a political hegemony or insurgent memeplex not only implies the creation of material infra-structures to make the values it articulates explicit, but places demands on us as subjects. How are we to become hosts of this new world? How do we build a better semiotic para- site—one that arouses the desires we want to desire, that orchestrates not an autophagic orgy of indignity or rage, but an emancipatory and egalitarian community buttressed by new forms of unselfish solidarity and collective self-mastery?

0x19 Is xenofeminism a programme? Not if this means anything so crude as a recipe, or a single-purpose tool by which a determinate problem is solved. We prefer to think like the schemer or lisper, who seeks to construct a new language in which the problem at hand

is immersed, so that solutions for it, and for any number of related problems, might unfurl with ease. Xenofeminism is a platform, an incipient ambition to construct a new language for sexual politics—a language that seizes its own methods as materials to be reworked, and incrementally bootstraps itself into existence. We understand that the problems we face are systemic and interlocking, and that any chance of global success depends on infecting myriad skills and contexts with the logic of XF. Ours is a transformation of seeping, directed subsumption rather than rapid overthrow; it is a transformation of deliberate construction, seeking to submerge the white-supremacist capitalist patriarchy in a sea of procedures that soften its shell and dismantle its defenses, so as to build a new world from the scraps.

0x1A Xenofeminism indexes the desire to construct an alien future with a triumphant X on a mobile map. This X does not mark a destination. It is the insertion of a topological-keyframe for the formation of a new logic. In affirming a future untethered to the repetition of the present, we militate for ampliative capacities, for spaces of freedom with a richer geometry than the aisle, the assembly line, and the feed. We need new affordances of perception and action unblinkered by naturalised identities. In the name of feminism, 'Nature' shall no longer be a refuge of injustice, or a basis for any political justification whatsoever!

If nature is unjust, change nature!

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Laboria Cuboniks (b. 2014) is a xenofeminist collective, spread across five countries and three continents.

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Culture Without Mirrors—Restructuring Creative-Cognitive Power

Amanda Beech

A means by which a critical culture defines itself as such is for its art, architecture and artifacts to picture the human as a subject of history. This is to say that buildings, forms, images and experiences posit critique as a manifestation of self-consciousness where shapes, forms, and sounds articulate an explicit understanding and explanation of the forces that dominate the relations and values of society and the place of the human that is produced through them and by them.[1] This mode of explanatory aesthetics identifies culture as an illuminating mirror of a human identity that is captured within and alienated by systems of its own making. But it also *brings about* a particular aesthetics of alienation. In short, this means that culture has indoctrinated the concept that subjectivity is a product of forces that are beyond any decisive power that might override them or change them, and furthermore, that recognizing this dilemma is *the normative impulse to change* that conditions our aspiration to seek autonomy from it, the result of which can only underscore law as habit. Within this bind of a pre-political nominalism—a subject crafted before itself—the figure of the self becomes the mark of the impossibility to determine ourselves as *anything otherwise.*

However, this thesis of constraint embeds a central contradiction where at the root of this humility is a remarkable persistence with the utopian fantasy that believes that the cultural exposition of contingent material in the public realm (this *being subject to* the unnatural laws of instrumental reason), results in achieving a status of a heteronomous nature as lived·[2] Here this culture as a form of consciousness obtains a transcendental

force, where consciousness provides access to a miasmatic participation with the nature of power as nature. So, it goes, culture can disconnect itself from instrumentalism to access a form of being—a free nature—through its self-realization *as culture.*

The subjectivity that is the consequence of this logic becomes the primary location and site for critique. It incorporates time and space, collapsing the subject and historical time as one manifest identity that presumes an essential specificity. As an obstructive mechanism or at best, a means of response by the understanding to what we might term the spontaneous history of an instrumental reason, our culture becomes the mirror of a self-relation to the nature of critique itself. In this identarian reflexive consciousness, culture manifests the multidimensional fabric of the city, the museum, interest groups and the home; it constitutes the communities that we inhabit and tells us that the present is all we have, since planning for longer term outcomes is not only impossible but morally suspicious. In these terms we are destined to the mythology of knowing self as the only exemplification of rational thought, and its aesthetic manifestation is not merely our extension but our replication of our desire to articulate the limits and the borders of reason. Read as a product of unnatural inorganic forces (this predilection to cause), the painful and tragic dilemma of subjectivity remains a strong fiction for culture to deride and to love—a problem to engross ourselves within and through which we can say that we have examined, interrogated and worked through the conditions that organize life.

In light of the destitution of cultural horizons, we must question the ways in which culture has embedded its comprehension of critique as an incorrect and unworkable form of metaphysics that had led itself to believe that it was operating under the rubric of a coherent materialism that sustained itself at the level of sensory materiality. This rejection of culture as a rational and representational operation demands work, for it is here where we must question the aspirations and methods for another comprehension of reason: a nontraditional metaphysics without traditional representationalism—that is, a culture without mirrors.

Questions

How can reason operate without returning us to the paradigm of a tragic self-consciousness that to all extents contains the contradictory facets of: a) the duality of reason and percept that generate a crisis state of introspection and ineffability; and b) the vitalization of the human as a form of pre-political nature that rejects forms of autonomy that produce change? Can such a consciousness be extrapolated without

projecting a Rortyian-style private irony of a classic liberal posture that pays lip service to a decentered subjectivity, heralds culture as the primary mode of affecting change (a form of transposing culture to the role of science), and without any consequence to the prevailing systems of capitalist distribution for both?[3] When self-preservation produces self-destruction, can skepticism be given a project beyond its own certitude, that is, without idealizing the space of indeterminacy (known unknowns) as the primary expression of knowledge?

Conclusions

The Myth of the Human

The figure of the human subject and its destruction is our central distraction, occupying and determining the space of what is falsely claimed as critical culture. Rejecting concepts of the powerful individual agent that capital has provided us in favor of a weak or impoverished image of the human does nothing to support political or cultural critique. The aspirations for a radical 'ungrounding' of the subject vis-à-vis its sublimation through capital leaves us with only dismal outcomes: i) the projection of process as the ultimate reification of figure as duration; ii) the subject in a form of Judeo-Christian struggle whose determination to process as a thing in itself demarcates only an ethos of difference that is essentially content-free; and/or iii) the subject who assumes that the dismantling of subjectivity constitutes some real loss, since it can only be expressed as limits, finitude or another such dimension of the tragic. The strong body of ideology is replaced by the weak and yet sustainable body of *ideology critique*—one mythology versus another.

The Social Realist Sublime and the Scientific Sublime

A result of this attempt to disengage representational work from culture ultimately results in a private expression of finitude that affiliates the image with the nonexplanatory and/or irrational. This perspective of cultural production holds and promotes doubt as a critical practice, and uncertainty and instability as the real of the image as well as the enterprise of political art. Here, we see the image taking place as a specifically general representational experience—as both spectacle and nature—a form of a redundant Kantian sublime where power is massive and disinterested: a form of capitalist social realism. Pitching the operations of one form of consciousness in direct correlative duality with another—such as free imagination versus standard mythology, or direct communication versus illusory images—only determines the site of critique that

dissects these as an uncritical fundamentalist subjective expression. In our paradigmatic examples of contemporary critical method, which span Kantian inspired reflection, phenomenology and affect, and scientific materialism, representations are consistently identified as a field that rationality cannot penetrate, only manage. A critique of representation is a means to access both the real of sensation and the objectivity of reason. In many senses the consciousness that is required for this critique is just not conscious *enough.* How images produce facts and make up rationally organized systems is crucial to our investigations.

The Negative Space of the Image

A valorization of the interpretative subjective reading of images is harnessed through the mystery of the image *per se*, or the experiential irresolution of meaning evidenced over time, which demonstrates the pliability of language in duration. The image now facilitates infinite encounters, possibilities and responses because all referents are unavailable as standard anchorages for meaning. We encounter these approaches across the different critical methods of negative dialectics, territories of perception, and in post-structuralism and post-deconstruction where the image is idealized through its infinite potentiality. The potentiality of the image is purchased through the discursive and the processional, only to be secured as the site that opposes these elements in abstract unification of the image as a form of 'oneness.' In other words, by opposing 'concept' by means of the infinitude of discursive processes, the image returns to the space of the sensory which instigates a cultic form of authenticity.[4]Accessing what we might imagine to be pure abstraction in art paradoxically becomes the ultimate reification of the oxymoronic figure as duration.

Failure to Act – Naturalized Skepticism

A comprehension of the image as essentially groundless and always already unstable in fact has a purpose and direction, especially when this theory is identified as the hallmark of a critical cultural practice. What is claimed as a defensible observation of the 'noninstrumental' or heteronomous nature of the image is in fact an unsubstantiated myth and ultimately a tool that moves from a theory of nature to a theory of the political. The agency of the image as nature in flux, in all its random and contingent identities is now at the service of various projects of democracy, egality, difference, and liberation in its work to undo and unravel all forms of stability in the political towards forms of disequilibrium. Problematically, because the idea of the image itself is assumed to be

adequate to nature, it is incapable of understanding the systems of force that organize its own construction, as a theory. This theory of the image as endowed with the spirit of the political and the body of the real is contradictory because it fails to recognize these notions of disequilibrium as 'goal' and as 'object' (or principle) as distinct categories. In short, although the theory of the image as nature occupies some unbridled, unregulated form that understands the image as 'real,' what is ultimately generated is another deeper skepticism of the image. This is because the image is asked to operate ironically as both nature and tool whilst neither can be accessed as such. This results in a failure to comprehend the condition of reality as well as the condition of a realist politics that might propose its adequation to this. This dualism of the image proliferates new forms of doubt that emerge from the conviction to refuse critical consciousness. A new critical negativity is universalized to the principle of skepticism, where a self-conscious critique is reestablished in dualisms that spring from pluralist hopes. These are unworkable for the project of real criticism.

Project

It is important for us to extrapolate a distinction between the methodological paradigms of scientific knowledge and self-conscious knowledge (whether this is purchased purposively or naively) in order to organize a cultural practice that does not avoid a cognitive understanding of the conditions in which it finds itself, but crucially, also refuses to situate these as a negatively charged real-ideal identarian foundation by which to oppose and anchor a *different future*. The ideological character of a theory of cause, subject and historical consciousness has been classified as tethered to the forces of preconception and intuition, theology, belief, and perception. Reason has also been understood as the pervasive force of a dominant power that leads to the horrors of absolute mastery. As we have seen, the logic of escaping these assumed systems of dominance that are proposed in schemas of either unconsciousness (sensory, affect-based) or what I have termed self-conscious practices, results in underscoring a form of critique that continues to vouch for the myths of mastery and transcendence endemic to this description of reason, since therein exists the erroneous belief that we are free to choose or reject consciousness.

We can say then that consciousness and self-transformation are necessary to a shift in the political, since we require a shift in the standard conception of critical method and cause.[5]Inhabiting this as a commitment then becomes a question of how one might act according to this rationale. A simplistic denial of the systems of authorship, or to deny

authorship as individuation in favor of a collaborative interdisciplinarity, is a weak semantic approach to this problem.[6] Furthermore, the persistence of extending the ego towards objects does little to rethink the very format of consciousness and how culture might cease to exist as a mirror of this paradigmatic individual. When our conscious life is produced across the terrain of images, we need to propose a role for images that is coherent with this reality and which projects reality as a model that includes us, but cannot be about us.[7]

The question here concretely addresses how such thinking is capable of reorganizing not just the products of culture but the productive relations of society and culture together. This work requires consensus building and action towards a new universalism. This is to produce culture that is rigorously engaged in the conditions of these deeper realities. A politics that manifests the 'as if' is a culture that acts in accordance with the real of reality as a form of realism. It must determine the 'as if' to be *the case* and not the fictive thought of the 'what if?' We must be careful to occupy the grounds that demand correctness, rather than appeal to the folklore of a capitalist framework, one that as we have seen is the drug of familiarity, satisfaction and comfort dressed in the appealing moral garb of the crisis of negativity. To refute the conditions of a regime we require new proofs, but to transform the productive relations of a culture that serves capital in order to transform the system itself, requires not a general address to the image itself as the problem, but instead the operation of the image as factical weapon, one which can be deployed in carefully chosen battles.

A culture without mirrors—a culture that is not a reflection and therefore has no concept of a specifically *human nature* as its grounds—is the possibility to think representation without an investment in subject or cause. It might also predict the fear of a culture without empathy, solidarity and community, for how can we understand each other without this mode of identification? Would this risk a form of radical individualism and destroy the forms of collective consciousness that have been hitherto required for change?[8] This is a false anxiety since this fear fails to understand that images are not constituent parts of the human. Whilst we are images, images are not us and knowing this is not the formulation of some crisis.

We have been careful to distinguish this new culture from a culture without mirrors. But this different culture produces living operational models that figure the horizon for a culture as necessary, and which inscribe a reality that is performed within but cannot be accommodated by the prevailing principles of neoliberal power. The necessity and

urgency of understanding how rationalist and creative practices operate at the level of representation *and cognition* then is key: This is a question of how culture can present and inhabit reason.

We have outlined the requirement to dismantle the idealism that supports a universal notion that conditions the nonexplanatory identity of culture to a politics, and to refuse the normative representation of negativity as an object that holds a *democracy to come*. What is also clear is that a culture that self-consciously discloses, exhibits or analyses this nonexplanatory aspect of itself assumes a form of transcendental knowledge that further establishes culture as a form of eccentric work that fantasizes about its political power from the realms of bourgeois interior decoration.

The task for culture then is to comprehend the role of consciousness again, correctly, and, by doing so, to recast the operation of its representations. A culture that is critical, or skeptical, of the circumstances in which it finds itself should not be involved in the legacy of Cartesian paranoia of the kind we have been discussing here. Rather, this must be a culture with rule—one that ultimately disposes of myths that have already been proven as incorrect. To behave according to this other rule is now the task of a culture that rigorously *reflects without mirrors*. A culture as a projection machine that makes worlds that are not of the order of the pejorative-fictive (left to the alterity of the imagination), but a culture of a rational imaginary as an insinuation of proofs, ready for conjecture; casting off the DNA of self-doubt towards an operation that is grounded in a new epistemology, one that requires a rigorous consciousness, but with no anticipation of its limits.

Footnotes

1. We can cite neo-liberal capitalism as the figure of such power, but tied to this is the correlative relation between reason and cause.

2. Consider Hermann Hesse's novel *Steppenwolf* (1927) where a similar delirium of a cultic modernist subjectivity is accessed as a product of the social constraints that he faces.

3. We see this in the claims to the space of culture as the 'open.' The image combines the *never and forever* of production and refusal, of writing and difference. Images are innately negative: they are gatekeepers of the 'open' and take center-stage in catalyzing the political claims for culture as becoming. In Giorgio Agamben's essay "What is the Contemporary?," he writes of the operations of culture as something that sees beyond the conditions of the *visible given* to the darkness that is yet to be light. This anticipation from the contemporary producer of culture reads as a form of Nietzschean modernity where the artist resides in a time that is "out of joint." The resulting projection is a figure of a typically transcendent nature, and a place where politics happens

culturally by dint of its ability to escape the strictures of the given by not recognizing them as such. This is a description of the nature of the image and the task of the artist to realize this nature. Chantal Mouffe's theory of 'agonism' as a condition that acts as the defining framework for a radical democracy also rests upon a theory of negativity, where agonism guarantees the ungrounded nature of political action in processes of disagreement at the level of relational affirmations of communal identity differentials. These operations of difference are centered in a politics of recognition, where difference is recognized and tolerated as such. However, to build a political project upon this dialectic of negativity is naive and contradictory, because whilst we can say that we do not have adequate explanatory reasons for perception, this does not mean that this will always be the case. And, whilst we cannot rationalize images in any concrete sense, this does not mean that we cannot understand their operative function in context-based systems.

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5. See Reza Negarastani. "The Labor of the Inhuman, Part 1: Human." *E-flux journal*, 52 (February 2014). Web.

6. In *Philosophy and the Spontaneous Philosophy of the Scientists,* Althusser denigrates the culture of interdisciplinarity as an insidious ideological force: "...interdisciplinarity is usually the slogan and the practice of the spontaneous ideology of specialists: oscillating between a vague spiritualism and technocratic positivism" (97). Luis Althusser. *Philosophy and the Spontaneous Philosophy of the Scientists*. London: Verso, Radical Thinkers series, 2012. 320. Print.

7. See Thomas Metzinger. *The Ego Tunnel: The Science of the Mind and the Myth of the Self.* New York: Basic Books, 2010. 234. Here, he identifies a future of avatar-to-avatar communications and autonomous self-managing brain design brought about through the expansive technological form of the ego tunnel in cyberspace. As image consciousness is transformed in technological mechanisms, so must we transform the projection of the human that generates life in an enlarged and unprecedented manner. How this modificatory paradigm enables some shift from the Kantian

notion of autonomy is the issue in this case since the question of what we desire to be is crucial—what Metzinger refers to as "consciousness ethics."

8. As we have seen, such universalisms have been proposed in the discourse on the sublime, where in order to think the political, a private self-consciousness is grafted upon forms of public consensus and change, but ultimately this is incapable of guaranteeing any form of collective consciousness.

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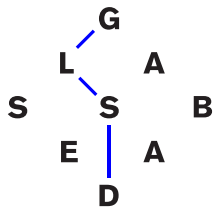


JOURNAL > SITE 1: LOGIC GATE, THE POLITICS OF THE ARTIFACTUAL MIND | 2017

Logic Gate, The Politics of the Artifactual Mind

Glass Bead

Artificial Intelligence profoundly disturbs the sense we have of our own intelligence. In many domains, its information processing power has surpassed human capacities, fundamentally altering the political economy. It has provided indispensable tools that have facilitated what was previously difficult or impossible, ushering in new modes of experience, communication, and artistic expression. At the same time, it has transformed the political landscape in critical ways. It has been the cause of algorithmically amplified discrimination, global surveillance and securitization, data-driven political manipulations, cyber-warfare and the exacerbation of already existing inequalities, as well as increasing unemployment, alienation, and mental health crises. In many ways, computational processes allow humans to transform and organize their experience in enhanced ways, to access what was inaccessible in their local milieux. Yet, in most of its already existing forms, AI has surreptitiously crystallized various social antagonisms and compounded local hostilities and identitarian struggles, fragmenting the contemporary political field in ways that seem increasingly intractable.

There is a strange and complex dialectic between the personal and impersonal at play in the politics of AI. Personal users roam their filter bubbles and customized search results while behavioral analysis companies harvest data according to impersonal protocols. The formal procedures of computation, and the growing use of AI, are impersonal in the sense that they do not discriminate on the basis of personal assumptions but only according to the available data. However, the rapid development of such technologies are largely directed towards corporate and political ends that are intentionally obscured by

their intimate and informal interfaces. Big Data engineering firms are not just passively facilitative but actively manipulative, they play active roles in the personally-targeted shaping of opinion.[1] The web behemoths portray themselves as neutral providers but are engaged in the management of the hegemony that best suits their interests, and many supposedly impartial algorithms and AI interfaces are riddled with bias. This data-driven engineering, of *affects* as much as information, targets users through a constrained picture of their cognitive capacities that (apparently for their own safety) corrals them into a local enclave in which they find themselves individually trapped, paradoxically by their own connectivity.

The old caricature, which figured reason, logic, and computation as dispassionately detached, condensed in the 'straw vulcan' formula, is no longer tenable in the age of affective engineering. It is exactly when the indifferent protocols of computation have managed to differentiate and personally address us that we are most in need of embracing the interpersonally collective and yet radically impersonal force of reason.[2] In the same way in which the technological construction of the future has been hijacked by financialization and corporate interests, so impersonal reason has been commandeered by AI platforms (Google, Apple, Facebook, Amazon etc.) that are building globalized infrastructures that increasingly personalize and localize us, tricking us into believing that there is no alternative.

This personalized incapacitation is exactly why we must reclaim impersonal reason: to extricate ourselves from such locally circumscribed horizons, and to gain the power to collectively act on global problems. This is by no means to diminish the importance of local struggles and identity politics, it is precisely because of the aggravated nature of these problems that we need to identify with the collective power of reason. Thus, these pressing questions: If the development of AI is driven by class interests and private property, how can we reclaim the disinterested force of reason that AI unleashes towards a common purpose? How can the global computational capture of impersonal reason be repurposed towards the different emancipatory ends of diverse locally constrained persons? How can transient connectivity give rise to robust collectivity?

While the capacities of thought are being externalized in machines that increasingly mirror human intelligence, the question of the technical artifactuality of mind and its political ramifications becomes particularly pressing. The externalization of cognitive capacities onto digital devices has reached a point where we risk the piecemeal

surrendering of every aspect of our (asymmetrically distributed) freedom to a covert algorithmic colonization. The truth is that there is no way back; we must confront the contemporary injustices of computational culture by interrogating its logic.

Faced with the rise of thinking machines we need to understand what thinking is. In the recent history of this debate, there is something of a recalcitrant opposition. On the one hand, in cognitive science there has been a tendency to explain cognitive capacities in reductionist terms, and an increasing capture and exploitation of those functions embedded in technical apparatuses of control. On the other hand, particularly within the humanities we have inherited a critique of mechanization that leaves us with a picture of mind as something irreducible to mechanistic decomposition. As the development of AI insidiously gathers pace, like a tidal wave swelling gently over the harbor, we are at a juncture where the question of what mental autonomy or rational freedom really *is* acquires a new significance. This implies contending with scales below the level of personal experience—sub-personal neurological processes; and beyond it—collective social, technical, and political processes. Rather than believing thought to be irreducible to mechanism, we need to develop the scientific image of cognition so that its dynamic mechanistic explanation is consistent with the autonomy of reason. Rather than ruthlessly reducing thought to fundamental components we need to grasp the way in which the freedom of thought is a political project and an ongoing process of techno-socially enabled elaboration.

Edinburgh Skull, trepanning showing hole in back of skull, 7000 BCE. Wellcome Library, London. Wellcome Images

The Inhuman Artifact

The first issue of Glass Bead's journal, titled *Site 0: Castalia, the Game of Ends and Means*, was dedicated to repositioning art in the landscape of reason. This issue is focused on the fabric of reason itself, and to the ways in which it is currently being altered by the emergence of artificial intelligence. Far from being limited to the computational instantiation of intelligence, understanding the politics of these developments in *artificial* intelligence requires acknowledging that mind has always been *artifactual*. *Site 1: Logic Gate, the Politics of the Artifactual Mind* proposes to explore the formal, philosophical, and scientific dimensions of this question, so as to consider the role art might play in the lucid unfolding of its possibilities.

Logic, in the wide sense in which it is taken here, appears to be the precondition for the artifactual elaboration of mind. The classical image of logical thought presupposes the capacity to make inferences, to construct propositions and to make inferences. Rational

agency is depicted as just the individual ability to make deductions, inductions, abductions. Logic, so posed, constitutes the transcendental framework of reason, that through which thought occurs. It appears as though it were the software that comes bundled in the human package, and which loads up automatically when it boots up. But, unless we are to swallow some theological creation story, we must acknowledge the incremental development of rational capabilities in the material environment in which thought emerged. The transcendental framework of reason did not descend from the heavens, nor was it unearthed in one piece. Rather, it emerged through a gradual interactive and interpersonal process of discovery and invention, in the co-construction of inferential resources and the collective transformation of normative values, in the weaving together of the material and immaterial, the real and the ideal. That is, if we can speak of a transcendental framework of reason then it is not a fixed *a priori* but is constructed *a posteriori* by a long process in which the conditions of possibility of thought are dialogically elaborated.

If we cannot *think* without presupposing some implicit logical structure then we cannot hope to transform thought without the dialogical articulation and explicitation of these structures. Logic, so understood, is an active site: it is an open gate on the ongoing elaboration of mind as a dual process by which practical and formal reasoning engage in co-constitutive transformation. Logical thought coalesces in an inhuman engineering loop whose forward momentum requires the incessant decomposition and recomposition of its structural components and functional properties. It is not a fixed given but a nature already denatured over a long process of biocultural coevolution, transformed by the collective manipulation of the natural and cognitive environment. In other words, *logic is the ultimate artifact*. It is an artifactually constructed conduit that leads to the amplification of intelligence, the invisible portal that opens to the artifactual expansion of mind. If reasoning is how we exit one world and enter another, logic is its gateway.

The term logic gate in its normal usage refers to an elementary component of a digital circuit that either describes or embodies an ideal Boolean function (a "switching function," found in binary decision diagrams, "simple games," or social choice theory). On the most general level, logic gates can be defined as the materialization of a form of organization according to the instantiation of specific rules and constraints. This materialization of explicit logical rules is what underlies the modern computer and the vast planetary computational infrastructure that pervades every aspect of contemporary life.

Such a foregrounding of logic does not mean that we must transform all thought into a series of signs drawn on a blackboard, or that artworks have to be reduced to their formal symbolic articulation. By naming the site of this issue *Logic Gate,* we do not either merely refer to this modern digital electronic administration of logical operations, but to the wider way in which dialogical interactions are implicit in rational thinking, and is embedded in the deep historical evolution of mind. What we are experiencing today is certainly without precedent, but the profound dynamics of this self-transformation trace back to the deep history of early hominins. The history of mind has been nothing but the history of its artifactual construction through which mind emancipates itself from its natural constraints: mind is just the process of its artifactual auto-alienation from nature. Naturalistically speaking, the deep historical development of artifactually enabled cognition is a vector of amplification with no telos. From the perspective of human freedom, we should not allow this wandering to aimlessly blunder into further violence and destruction. We must give this movement direction.

Both in the narrower sense of contemporary computational culture and in the wider sense of the artifactuality of mind, the logic gate has never been a neutral cognitive tool for grasping what *is the case* but always an apparatus of power, a contrivance for organizing what *ought to be the case*. The logic gate is thus an eminently political site, underlining the role the artifactuality of mind plays in its organization as well as in its transformation. For some, logic is a form of domination, an intrinsically oppressive structure that upsets the fragile equilibrium of the Earth, putting us on a demented course towards the eradication of nature and the auto-annihilation of freedom. For others it is an emancipatory trajectory that spirals out to superintelligent Artificial General Intelligence (or AGI), cutting thought loose from its parochial human form, its restrictive biology and morality, and disencumbering intelligence from the contingent structures in which it emerged. Glass Bead's *Site 1* argues against ruthless reductionism and essentialist irreducibility, exploring instead the lucid transformation of our artifactuality, the deliberate use of this inhuman vector of alienation embodied by the logic gate to reengineer what it means to be human.

Charts

The contributions gathered in *Site 1: Logic Gate, the Politics of the Artifactual Mind* explore and formalize the opportunities this inhuman vector of alienation provides for art, science, and philosophy to engage in the artifactual transformation of the mind. They are divided into three charts that are meant to figure specific routes drawn in the site by the contributors to this issue.

Chart 1: Inhuman Transformations

Having embarked on a process of constant elaboration and transformation of itself, the human mind is nothing but the reflexive and revisionary process of its artifactual elaboration. As such, mind progresses by reaching for what lies beyond it, by integrating into itself that which it is not—i.e. by tarrying with the negative. This inherent inhumanism is precisely what makes us most human. The contributions gathered in this first chart explore the deep history of this impersonal dynamic, from the feedforward movement triggered by the emergence of semiotic processes in the human environment to the problem of the genesis of an ideal language, and from the discussion of particular systems of formalization to that of the political potency of reason.

Chart 2: Impersonal Entanglements

This chart addresses the political consequences of the way in which logic is embedded in our computational landscapes and how we can engage in a transformation of its conditions. This planetary distribution of AI produces a denaturalized environment, a fully artifactual nature constructed upon the impersonal operations of logic. The contributions gathered in this chart explore the ways in which this global computational culture acts both as a vehicle of intensification and a revealing agent of epistemic, technological and social biases, from the impact of computation on urban space and subjectivities, to the way technological instantiations of machine intelligence transform the conception of thought as such.

Chart 3: Denaturalizing Experience

This chart explores the pendular oscillation between impersonal reason and personal experience in logical processes crossing art and politics. It describes the various ways in which human cognitive abilities have been externalized in historically constructed apparatuses of formalization, from the invention of diagrammatic reasoning in Ancient Greek mathematics to the computational logic embedded in modernist poetry and textile practices; and from the distributed intelligence at play in soundsystem culture to the normative constraints underpinning both political hegemony and the possibility of formulating counter-hegemonic practices.

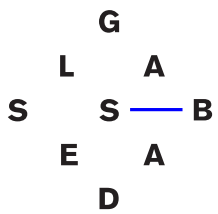
The authors wish to thank Lendl Barcelos and James Trafford for their comments on an earlier version of this text. (#_ftnref1)

Footnotes

1. For example, Cambridge Analytica, by profiling citizens and modeling their potential voting behavior, was held by some to be critical in swaying the result of both the Trump election and the campaign for Brexit. While there was certainly some hype from both sides (critical and congratulatory) concerning the extent of this effect that has been discredited, the new capacity to shape mass opinion by the targeted use of information wasn't totally ineffective, and demonstrated a real shift in the manufacture of consent.

2. This formulation, and the thrust of the argument here are indebted to the work of Reza Negarestani: "[the formal autonomy of reason] signifies a certain form of being bound to laws and constraints which are imposed neither by nature nor by the individual subject of experience and understanding, but by the interpersonal subjectivity of reason which, in its very special kind of inter-personality, is also impersonal—that is, de-individualizing and cognitively communist." Reza Negarestani, "Causality of the Will and the Structure of Freedom", 2017, talk given at an undisclosed location in New York.

Glass Bead is an international research platform and journal. Glass Bead was conceived and is run by Fabien Giraud, Jeremy Lecomte, Vincent Normand, Ida Soulard and Inigo Wilkins.



JOURNAL > SITE 1: LOGIC GATE, THE POLITICS OF THE ARTIFACTUAL MIND | 2017

What Is It to Think?

Danielle Macbeth

What is it to think? Perhaps there is no one answer for everything we might reasonably characterize as thinking but only family resemblances among the various instances. Nevertheless, one sort of case is emblematic, at least in the Western intellectual tradition: reasoning that involves the manipulation of signs according to rules. Some instances of thinking in this sense are algorithmic; not only is each step licensed by a rule, rules also determine which (step-licensing) rule is to be applied at any given point. Doing an arithmetical calculation in the positional system of Arabic numeration is a paradigm of algorithmic thinking, which is why it is easy (relatively speaking) to build a machine to perform such calculations. More interesting cases of rule-governed thinking are not algorithmic. In these cases, each step is licensed by an antecedently specifiable rule but it is not determined in advance which rule ought to be applied at any given point. Chess playing is a familiar instance of non-algorithmic, rule-governed thinking. Although it is not so hard to build a machine, or for that matter, teach a child, to play chess according to the rules of the game, to make only legitimate moves, it is much harder to build a machine, or teach a child, to play chess well, to make only *good* moves, moves that will improve one's chances of winning. Finding proofs in mathematics, at least in interesting cases, is also like this. But although it is hard to build a machine to play chess well or to find a proof of an interesting mathematical theorem, it nevertheless has been done. The question, my question, is: are the machine and human reasoners both *thinking* in precisely the same sense when they engage in such rule-governed manipulations of signs? What I aim to show is that although we humans, we rational

animals, can think mechanically, that is, in essentially the way a machine thinks, we humans can also think differently, even when the thinking involves the rule-governed manipulation of signs. The aim is not to show that physical systems cannot think. Clearly some can: we are physical systems and we can think. What is at issue is what precisely it is to think as we do.

Supercomputer Deep Blue at IBM's headquarters in Armonk, New York, on February 16, 1996. Photograph by Yvonne Hemsey/Getty Images.

Perhaps it will be objected that it is *obvious* that what the machine is doing in thinking is precisely the same as what we are doing in thinking because thinking (in the sense of concern here) just is the manipulation of signs according to rules and both we and the machine *are doing that*. Such differences as there are between the two cases—and, of course, there are differences—are simply irrelevant, and there is indeed a way of thinking to which this is obvious. Nevertheless, as our intellectual history over the past three millennia has again and again taught us, what is obvious given one conception of things can be revealed to be false in light of a subsequent conception. Consider, for example, the

notion of a number. As the ancient Greeks thought of it, a number is a collection of units, from which it follows not only that zero is not a number, but also that there are no negative numbers, or fractions—although there are ratios of numbers. Indeed, as ancient Greek philosophers liked to point out, even one is not a number on this conception, but only the unit that provides the basis on which to form the collections that *are* numbers. The modern number concept is very different. A number on the modern conception is conceived computationally: a number is what stands in various well-known arithmetical relations to other numbers, in effect, a node in a web of arithmetical relations. And now it seems obvious that zero and one are numbers, and that there are negative and fractional numbers. Similarly, we need to see that although it is obvious that humans and machines think in precisely the same sense relative to the conception of logic and reasoning that is bequeathed to us by modernity—a conception that is, we will see, essentially Kantian—once one moves to a properly post-Kantian conception of logic and reasoning, it is not at all obvious that humans and machines think in precisely the same sense. Indeed, it is demonstrably false.

That both the practice of mathematics and the practice of physics were revolutionized in the 17th century is well known. Less well known is that both were again radically transformed a few centuries on, the practice of mathematics in the 19th century and that of fundamental physics in the 20th century. What is almost wholly unknown is that the practice of logic has followed suit. The received view is, in Quine's words, that "logic is an old subject, and since 1879 it has been a great one."[1] Logic, on this view, was first begun by Aristotle as syllogistic logic and then transformed into our standard polyadic predicate, quantificational logic by Frege in his 1879 *Begriffsschrift*. This is *not* what actually happened. In fact, logic was transformed already by Kant in the wake of Descartes' radically new work in mathematics and philosophy; it was *Kant* who gave us all the essentials of our standard logic, first, the division of terms into two logically different sorts of representations, and with that division the modern notion of a quantifier, and also the idea that logic is purely formal, without content or truth. What *Frege* did was to transform logic again, this time in the wake of 19th-century developments in mathematics due to Riemann and others.[2]

Ancient Aristotelian logic is a term logic, where a term is what things are called: Socrates, snub-nosed, human, sitting, and so on. Terms have, in other words, both referential and predicative aspects. In the subject position a term picks out what it is that is being talked about; in the predicate position a term serves to characterize that which is talked about. To judge, on the ancient Greek conception, is to *predicate of* one, some, or all things of

some sort that they are or are not so. It follows that one can *judge of* only what exists, and that only what exists has a discoverable essence and can be defined. Aristotelian logic serves to determine the valid syllogisms involving two categorical sentences as premises and three terms; and these syllogisms are in turn of interest in light of their role in scientific demonstrations, where a demonstration is a syllogism in which the premises are true, primary, immediate, and better known than and prior to the conclusion, which is related to them as effect to cause.[3] The concern of Aristotle's system of logic is actual acts of inference in the context of scientific explanation of what is and must be so. Modern quantificational logic is very different. First, it draws a logical distinction among what Aristotle thinks of as terms between referring and predicative expressions. The distinction appears first in Kant. Kantian intuitions are purely referential; they belong to the receptivity of sensibility and give objects for thought. Kantian concepts are purely predicative; they belong to the spontaneity of the understanding and are that through which (given) objects are thought. This division is, furthermore, a successor of sorts to Descartes' division (grounded in his new mathematical practice of analytic geometry) of sensory experiences, which are confused mental effects of the impacts of external bodies on our sense organs, and clear and distinct ideas that are innate in us and fully meaningful independent of the existence of any objects that might correspond to those ideas. As Descartes explicitly notes, in what he thinks of as the "true logic", as contrasted with Aristotelian logic, it is false that only what exists has an essence; instead, essence precedes existence.[4] What is altogether original with Kant is, first, that intuitions (caused in us) and concepts (that are fully contentful independent of any relation to any object) are logically different as belonging to two essentially different cognitive faculties, and second, that *both* are constitutively involved in any cognition. In Kant's famous slogan: "[T]houghts without content are empty, intuitions without concepts are blind."[5] For Kant, though not for Descartes, all content lies in relation to an object, and all cognitive access to things is through concepts. It immediately follows that logic, insofar as it abstracts from all relation to any object, is strictly *formal*, without content or truth.[6] It also follows that some *new* mechanism of reference to objects is needed if judgment is to be possible. Because Kantian intuitions are blind without Kantian concepts (and hence can have no direct role to play in judgment as Kant conceives it), and Kantian concepts are not themselves in any way object involving, though *judgment* is, Kant thinks, constitutively object involving (because contentful, truth evaluable), we must learn to conceive judgment in a new way. We must learn to conceive judgment as an act of positing a relation of subject and predicate concepts *as* objectively valid, that is—subject

and predicate concepts as combined in an object or objects. It is on behalf of just this conception of judgment that Kant introduces the universal and existential quantifiers as the mechanism of reference to objects in a judgment. The familiar Venn diagram, as it contrasts with an Euler diagram, provides a graphic illustration of judgment so conceived.

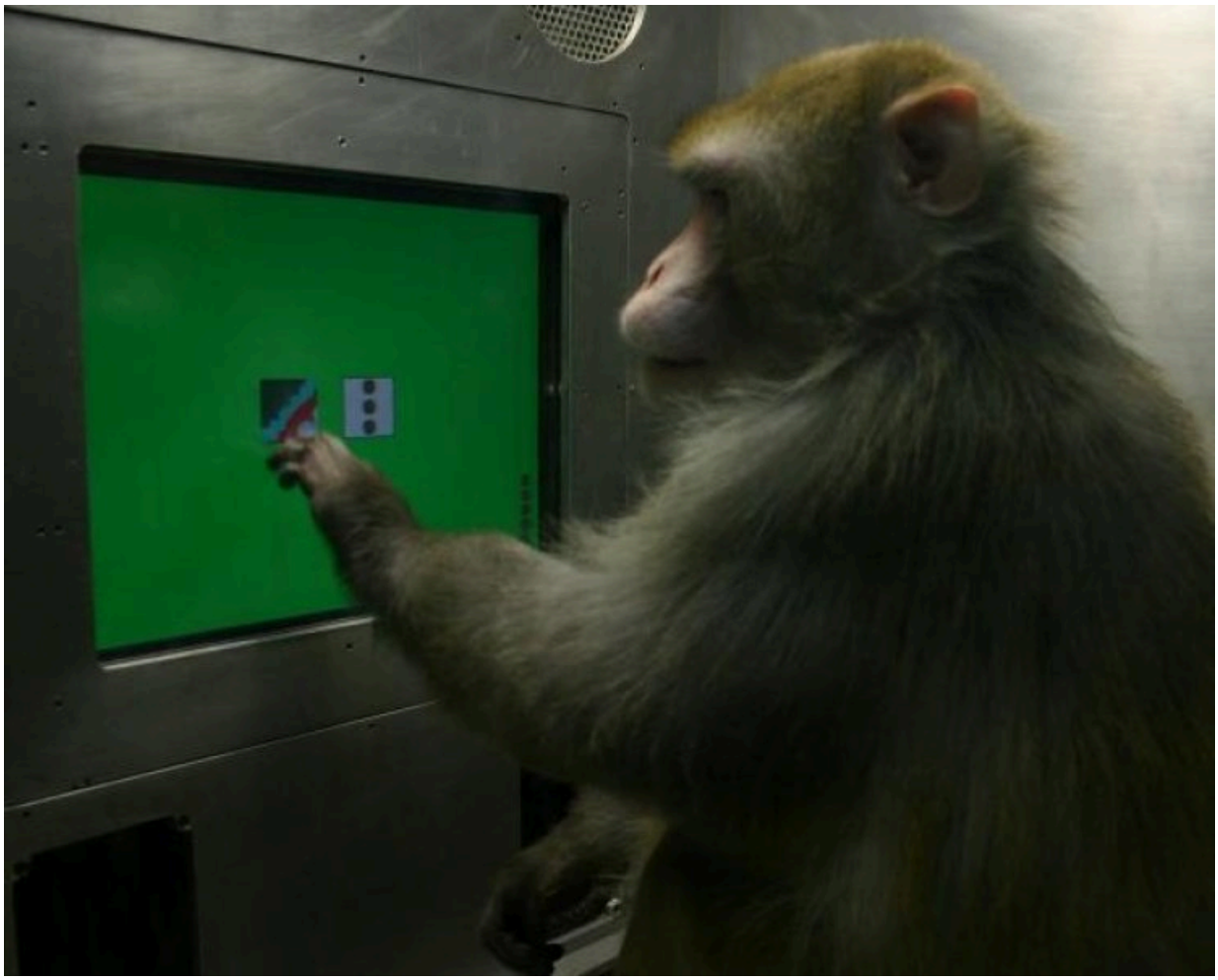
In a Venn diagram, one begins with two overlapping circles, one as the subject concept, the other as the predicate concept. But by contrast with what is found in an Euler diagram, the two overlapping circles of a Venn diagram do not thereby already express a judgment (the judgment that some S is P), as they would were that same drawing to be read as an Euler diagram. In a Venn diagram, there is in the two overlapping circles no reference to any objects or indeed any form of judgment at all, but only a space within which a judgment might be made. In order to make a judgment one must do something more to indicate that *objects* are thus and so in relation to the two concepts. Either one shades out some region showing thereby that *no* objects have some particular constellation of properties (the shading serving in effect as a universal quantifier), or one puts an 'X' in some region to indicate that *some* objects, at least one, have a particular constellation of properties (which is of course what the existential quantifier does). In neither case is one talking about any objects in particular; one is referring to objects in general by means of quantifiers. And this must be so because, again, concepts on Kant's view are *only* predicative and cannot give objects, but objects must yet somehow be given if judgment is to have any objectivity and truth. Kant's logic is, as our standard logic is, distinctively formal and quantificational.[7] Aristotle's logic is neither formal nor quantificational. And neither is Frege's.

We have seen that from Kant's perspective Aristotle's notion of a term conflates the logically distinct functions of referring and predicating. So, from Frege's perspective, Kant's distinction of intuitions, through which (alone) objects are given, and concepts, through which (alone) objects are thought, conflates two essentially different distinctions: that of object and (Fregean) concept with that of *Bedeutung* (designation) and *Sinn* (sense). Whereas for Kant all cognitive significance—all being for a thinker—is through concepts, and all objectivity lies in relation to an object or objects, Frege teaches us to distinguish, on the one hand, between cognitive significance—that is, Fregean sense, *Sinn*, and concepts, which are laws of correlation that are the *Bedeutung* of concept words—and on the other, between objective significance, *Bedeutung*, and objects. Kant, Frege teaches us, was after all mistaken in thinking that all objective significance lies in relation to an object, mistaken in holding that all cognitive significance is predicative.

(This is of course not a criticism of Kant any more than it is a criticism of Aristotle that he did not recognize Kant's distinction. In the unfolding of the science of logic, each stage is necessary as the ground on which further distinctions can be made.)

Because, on Frege's account, concept words designate concepts conceived as functions, laws of correlation arguments to truth-values, there can be relations directly among concepts, relations unmediated by any features of objects. Frege, unlike Kant, has no need of quantifiers. What he needs instead are various second-level properties and relations, among them the property of being universally applicable. Such a second-level property holds, for example, of the first-level concept being a mammal if a cat since everything that is or would be a cat is or would be also a mammal.[8] But concept words, as well as object names, also express senses in Frege's system of logic. Where Kantian logic is founded on a dichotomy of logical form and empirical content, in Frege's logic, all expressions are contentful, and contentful in the same way: all express Fregean sense, *Sinn*. Because Frege also requires that one can ask after the designation or signification, the *Bedeutung*, of an expression only given a context of use, it is possible in Frege's logical language, though not in a Kantian one, to exhibit the contents of concepts in a way enabling rigorous reasoning on the basis of that content. Frege's is a language within which to reason from the contents of explicitly defined mathematical concepts. Like Aristotle's logic, and unlike Kant's, Frege's logic is designed to provide a language within which to reason in the exact sciences.

In standard, Kantian logic inferences are good, if they are, in virtue of their form; content is wholly irrelevant to the goodness of an inference in this system. Indeed, it is not even inference, the act of inferring, that is the focus in Kantian logic but instead the relation of logical consequence. To prove something in this logic is, as Wittgenstein notes in his *Tractatus* (6.1262), nothing more than a "mechanical expedient"; it is merely a mechanical means by which to show, make explicit, that the information in the conclusion is contained already in the premises. And *this* is something that a machine can do as well as any human being. Whether I manipulate the signs mechanically according to rules or build a machine so to manipulate the signs, the activity and the achievement is, in the two cases, precisely the same. Thus, it comes to seem that computers can think in just the sense we do, and correlatively that we human thinkers are in essence nothing more than biological computers.



A rhesus monkey chooses between images on a touch-screen computer monitor. Photograph by Herbert Terrace, Columbia University.

As conceived in Frege's system of logic, to say that an inference is good in virtue of its form is to say that it is an instance of something inherently general, something applicable in other cases as well. Any actual inference is, on this account, an application of a rule that applies also in other cases. Because in this system logical form does not contrast with content but is itself contentful, so-called formal inferences (that is, strictly logical inferences) are in a way *material* insofar as they depend on the *meanings* of the signs of logic. Again, the signs of Frege's logic express senses just as non-logical signs do, and because they do, logical truths really are *truths* on this account. They are thoughts we can know to be true, and about which we can find ourselves to have been mistaken. They are not mere forms. And to infer is, or at least can be, actually to do something, to make a move from one judgment or judgments to another, different judgment. Inferring is, in such a case, not merely a matter of making what is implicit in the premises explicit in the conclusion but is instead to make what is potential in the premises actual in the

conclusion. In a mathematical proof, as Frege conceives it, the premises contain everything that is needed in order to realize the desired conclusion but the conclusion is not already there in the premises, even implicitly. One must go through the steps of reasoning in order to bring about the conclusion; and here Frege's thought is, significantly enough, very like Kant's as regards constructions in mathematics. It is Frege's conception of language in terms of *Sinn* and *Bedeutung* that enables us to understand precisely how this is to work.

Imagine a person who knows how to count things but not any mathematical facts, even the most basic. Imagine further that this person wishes to know what, say, the sum of seven and five is. A good mechanical expedient for finding the answer would be to count out seven things, then count out five more things, then put all the things together and count the resulting collection, something we can do with, for example, marks on a page:

/////// /////

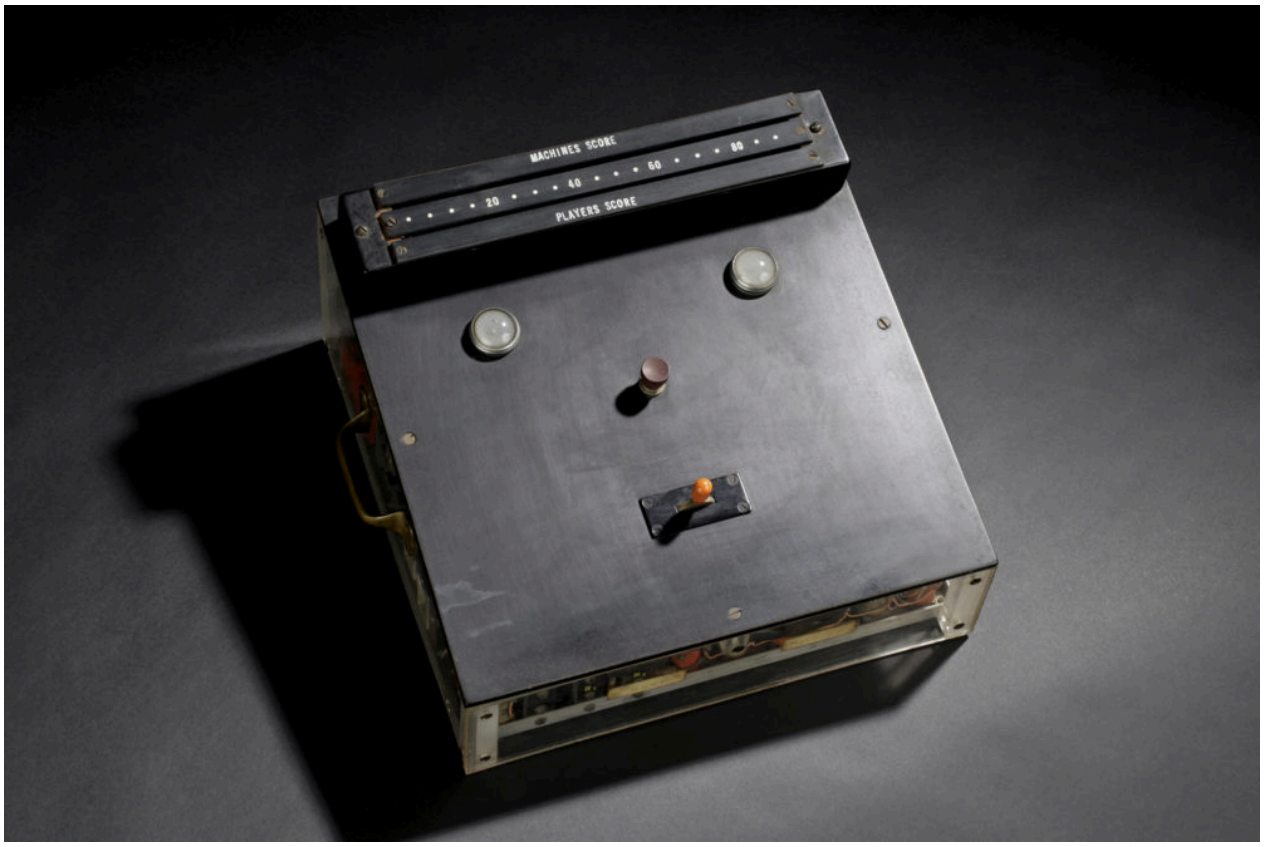
The collection on the left is a collection of seven strokes and that on the right is a collection of five strokes. By adding five more as I did after making the first seven strokes, I made, whether I knew it or not, a collection of twelve things, as I can learn by counting the whole. That there are twelve strokes is *already there*, contained implicitly in the display as soon as the five more strokes are added. What my subsequent counting does is only to make that fact explicit. A valid proof in standard, Kantian logic is essentially the same. One writes all the premises and thereby has, whether one knows it or not, the information in the conclusion. The steps of the proof, like the subsequent counting in our little example with the strokes, serve only to make that fact explicit.

Kant clearly does not think of the example of seven and five in the way just outlined.[9] According to Kant, the truth that seven plus five is twelve is not analytic but instead synthetic a priori. That is, according to Kant, being twelve is *not* contained already in the starting point, in the given numbers seven and five. Rather, Kant thinks, the number twelve can be *constructed* given the starting point, the given numbers seven and five. We can see how this is to work if we conceive the strokes on the page not as mere *things*—strokes on a page that perhaps also stand in for other things—but instead as primitive signs of an exceedingly simple mathematical language, as signs that express Fregean senses. We then can use these signs to construct complex signs designating numbers. On this reading, the collection of seven strokes is not merely that—a complex

sign that pictures a collection by itself being a collection (as, on Wittgenstein's Tractarian view, a proposition pictures a fact by itself being a fact)—but is instead a complex sign designating *one* thing, *the* number seven, through a sense that reveals that number as a certain multiplicity. Similarly, the collection of five strokes read as Frege would have us read is a complex sign for the (one) number five, a sign that designates *the* number five, again through a Fregean sense. On this reading, the individual strokes in the complex sign do not designate; only the whole complex sign, the whole collection of strokes designates. But once we have the *two* collections, the complex sign for the number seven *and* the complex sign for the number five, we can *construct* a sign for the number twelve by combining all the primitive signs into one. This is a mathematical operation, not a merely mechanical one, insofar as, first, we are using the strokes to display the arithmetical contents of the numbers seven and five, *what it is to be* such numbers (namely, certain multiplicities). Subsequently, on the basis of that displayed content, we manipulate the primitive signs in a rigorous, rule-governed way in order to show something about the numbers involved, that the sum of (the numbers) seven and five is (the number) twelve, a properly mathematical result.

The same distinction of mechanical and mathematical reasoning can be made for the case of a computation in Arabic numeration because, again, it is possible to read a numeral in that notation in either of two essentially different ways. The first, merely mechanical way is to read each of the ten digits as a numeral for a number no matter what the context of use. On this (mechanical) reading, '3' designates the number three, '7' the number seven, and so on for all the digits, no matter the context. Complex signs in the positional system of Arabic numeration are then read additively, with the positions of the numerals serving to mark *what* is being counted: '375', for example, pictures a collection of three hundreds and seven tens and five units. Such collections can then be manipulated mechanically, using, for example, an adding machine. But we can also read the sign '375' differently, as exhibiting the computational content of *the* number three hundred and seventy-five, its content as it matters to arithmetical computations. On this second (non-mechanical, properly mathematical) reading, the primitive signs only express Fregean senses independent of a context of use; they designate only in and as complexes. Moreover, the same point applies to the case of reasoning from the contents of inferentially articulated mathematical concepts. Although one *can* read the signs mechanically, as recording, or picturing, information (as in standard logic), one can also read them as Frege teaches us to read, as expressing Fregean senses that contain modes of presentation of the designated concepts. As I show in *Realizing Reason*, even strictly

deductive reasoning—conceived as Frege conceives it—can be ampliative, a real extension of our knowledge; and it can be because there is in such cases a kind of *construction* of the conclusion on the basis of the premises. By deductively reasoning on the basis of the contents of the concepts with which one begins, as given in their definitions, one proves theorems about those very concepts, about their relations one to another. The reasoning is not mechanical; it is mathematical reasoning of the sort mathematicians actually engage in.[10]



D. W. Hagelbarger and Claude Shannon's "mind-reading machine", 1953.

I have argued, first, that from the perspective afforded by modern, Kantian logic there is and can be no essential difference between the thinking of the mathematician and that of a mere machine because, on that account—with its strict dichotomy of logical form and content—thinking is and can be nothing more than the rule-governed manipulation of signs the meanings of which are completely irrelevant. But I have also shown that from the perspective Frege provides, we can see how it is that the mathematician's thinking on the basis of the contents of mathematical concepts is essentially *different* from that of a mere machine. That the machine can *mimic* our thinking is unsurprising given that any notation within which to reason (such as our little stroke language, the

system of Arabic numeration, and Frege's logical language) can also be treated mechanically. The signs themselves do not enforce a mathematical reading. Nevertheless, they *can* be read mathematically, at least by us human beings. That is, *they can be read* where to read is to extract the meaning expressed in a specially designed system of written marks. And because they can be read, they can also be misread. We (human) thinkers can make mistakes, and very often our mistakes are grounded in our failure adequately to grasp the contents of the concepts of concern to us. Consider again the example of the concept of number: we at first thought that negative and fractional numbers are not numbers because we understood numbers to be collections of units; we had the number concept, but did not yet fully understand the content of that concept. It is just as Frege says: "[O]ften it is only after immense intellectual effort, which may have continued over centuries, that humanity at last succeeds in achieving knowledge of a concept in its pure form."[11] The concept of *thinking* is another such concept. It is not simply given what *thinking* is. In the end, perhaps it is this very thing, the fact that we can think that we *know* in cases in which it is later revealed that we were mistaken, that makes most manifest the essential difference between a human thinker and a mere machine. *We* have second thoughts, and it is because we do that we can be said to have any thoughts at all.

Footnotes

1. W.V.O. Quine. *Methods of Logic*. London: Routledge and Kegan Paul, 1952. vii. Print.

2. These claims are developed and defended at length in my *Realizing Reason: A Narrative of Truth and Knowing*. Oxford: Oxford University Press, 2014. Print.

3. See Aristotle's *Posterior Analytics*. Book I, Chapter 2.

4. "We must never ask about the existence of anything until we first understand its essence." Replies to the First Set of Objections, in *The Philosophical Writings of Descartes*. Vol II. Trans. J. Cottingham, R. Stoothoff, and D. Murdoch. Cambridge: Cambridge University Press, 1984. 78. Print.

5. Immanuel Kant. *Critique of Pure Reason*. A51/B75. Trans. P. Guyer and A. W. Wood. Cambridge: Cambridge University Press, 1998. 193-4. Print.

6. This conception of logic as formal, lacking all content and truth, is made fully explicit in our model-theoretic conception of language. See, for example, Wilfrid Hodges. "Truth in a Structure." *Proceedings of the Aristotelian Society* 86 (1985): 135-51. Print.

7. Of course, Kant's logic is not precisely the same as our logic. In particular, it is not symbolic as our logic is, and it is monadic. Standard logic would be made symbolic in the second half of the 19th century, beginning with Boole, and extended to a full logic of relations at the turn of the 20th

century. This latter advance was made by Bertrand Russell and was, as he saw, a merely technical development. What Russell did not realize was that the essentials of modern logic were already in Kant; he thought they were due to Peano and, independently, Frege. See Bertrand Russell. *Our Knowledge of the External World*. London: George Allen and Unwin, 1914. 50. Print. Also, Jourdain's record of a conversation he had with Russell on 20 April 1909, in I. Grattan Guinness (Ed. and Trans.). *Dear Russell – Dear Jourdain*. New York: Columbia University Press, 1977. 114. Print.

8. See Chapter 2 of my *Frege's Logic*. Cambridge, Mass.: Harvard University Press, 2005. Print.

9. Kant discusses this case in the B Introduction of the first *Critique*. B15-16.

10. Again, the point is not that physical systems cannot think, but to highlight fundamental differences between the merely mechanical manipulation of signs according to rules and mathematical reasoning in a specially devised system of written marks, where the latter essentially involves what Frege has taught us to recognize as the *Sinn* of an expression as contrasted with its *Bedeutung*.

11. Gottlob Frege. *Foundations of Arithmetic*. Trans. J. L. Austin. Evanston, Ill.: Northwestern University Press, 1980. vii. Print.

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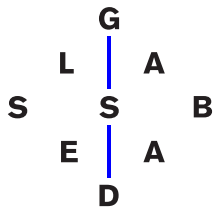

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Semiotic Epicycles and Emergent Thresholds in Human Evolution

Gary Tomlinson

1. Signs[1]

Two features mark the genus *Homo* at the point of its emergence some 2.5 to 3 million years ago: culture and technology. We know these as interlinked features, since culture—minimally defined as a sociality in which things learned in a lifetime are passed on to future generations—is revealed to us among early hominins by the artifacts they produced from stone-knapping techniques that required some form of imitative interaction for their persistence and eventual consistency of process. The first lesson of any deep-historical view of humans is that we were encultured toolmakers before we were human. And the corollary follows: humans did not invent either culture or technology but were invented by them, through the operation of selective dynamics always already cultural as well as biological, always shaped by material manipulations learned, taught, maintained, and enhanced across generations. These lessons were first appreciated by mid-20th-century observers such as André Leroi-Gourhan, and today they are accepted truths concerning our deep history.

Acheulean handaxes from the site of Boxgrove (England), 500 000 BCE. Photograph by W. Roebroeks.

While culture and technology distinguish our lineage from its beginning, however, they are not unique to it in the world today—and were not unique, doubtless, when hominins first appeared. We have come to understand that both toolmaking and culture (in my broad definition) are present in an array of mammals, birds, and even a few other animals. Thus, the evolutionary course that would ultimately distinguish us categorically from all other animals was not an inevitable outcome of technology and culture. Other processes and features played a part, and modeling these has come to be a primary goal in the attempt to explain in general terms the emergence of modern humanity.

To build such models requires locating culture and technology in a broader frame of animal capacities. Culture is nested within the larger category of sociality, as I have suggested. While all cultural animals are social ones, only a small portion of social animals are cultural ones; that is, only a few kinds of social animals learn things during their lifetimes that they impart to succeeding generations. Baboon troops show a complex interplay that establishes rankings of power and status among females, but no ranking or system of ranking is learned and passed on as such;[2] they are social animals without culture. Chimpanzees, on the other hand, develop regional differences among

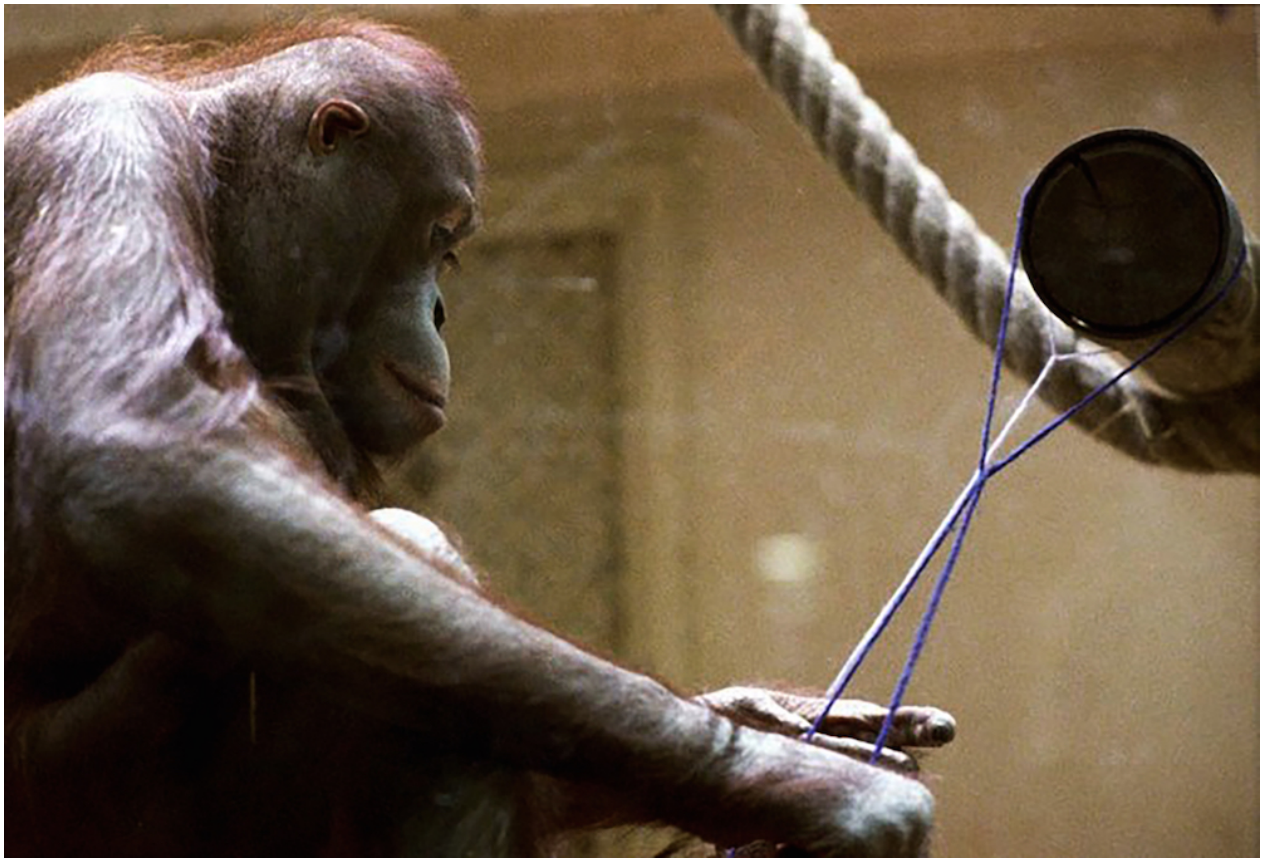
groups, with one group learning and transmitting repertoires of techniques not present in another.[3] Some passerine birds and both humpback and sperm whales also show such regional cultures, in these cases in the transmission of learned "songs" and click codes.[4] Technology is also nested in a broader frame, making up a small corner of the vast matrix of material interactions with the environment that all living things engage in. For animals with complex behavioral panoplies, distinctions need to be drawn between tool-making skills and a larger realm of complex, intentful manipulations of the material world. A New Caledonian crow sharpening a twig to spear grubs works its material environment in a way different from a bird building a nest; a chimp using a stone hammer and anvil to crack a nut seems to have crossed a categorical line, while a beaver constructing a dam has not.

These distinctions are not simple ones, and students of animal toolmaking have found it difficult to locate exactly the shift from a non-technological to a technological interaction with the world.[5] We need to think flexibly here, not of thresholds surpassed and switches flipped, but instead of an analogue spectrum—or better, a three-dimensional landscape of interactive possibilities, with kinds of interactions grading smoothly into one another and tendencies accumulating in some directions but not others. The same kind of judgment is called for in the matter of culture. There is no overt tipping point between culture and non-culture, between the transmission of learned archives and its absence, but instead an ideational contrast *we* draw that involves, in the real world, a broad terrain of subtly graded differences.

When, in toolmaking and the transmission of learned archives, a certain level of regularity and complexity is reached, it is useful to describe the resulting interaction between animals and their environments as the construction of a *taskscape*—a term coined by anthropologist Tim Ingold that I use to name the assemblage of activities learned and more-or-less consistently transmitted within a set of material and other constraints and affordances.[6] Taskscapes can be discerned in the activities of some nonhuman animals, but early hominin taskscapes came to surpass all others in their complexity at least half a million years ago, and probably a good deal earlier. Eloquent evidence of this comes from the meticulously reconstructed taskscapes of certain Middle Paleolithic sites, such as Boxgrove in southern England.

Both culture and technology also form parts of the realm of sign-making in the world—the *semiosphere*, in Juri Lotman's term.[7] Without deploying signs, no animal could possess culture or fashion parts of the world as tools for achieving—that is, *pointing toward*—certain goals. I interpret the semiosphere from the perspective of a

Peircean semiotics, not the more limited Saussurean one with its emphasis on human language, and in this I follow the course of most biosemioticians. (Where I do not follow them will become clear below.) Peirce saw a broad extent of signs in the world, one that reached, especially in his late thinking, far beyond humans. He perceived this breadth by focusing on the process of sign-making rather than on the structure of the sign itself, as Terrence Deacon, one of the foremost neo-Peirceans today, has understood.[8] For Peirce the semiotic process involved not only a relation of sign and object, however complex, but also a relation to this relation, which he termed the *interpretant*.[9] Identifying this aspect was Peirce's fundamental contribution to the theory of signs. For Peirce himself it located semiosis in its proper ontological place, which, by virtue of its relation-to-a-relation, is not one of relationality but of *meta*relationality—in Peirce's own terms, not one of *soundness'* but of *thingness*. The extra level of relations involved in thirdness is constitutive of all signs.



Female orangutan Wattana tying knots at the Jardin des Plantes zoo in Paris, 2012. Photograph by Chris Herzfeld.

The interpretant is the opening onto this extra level. Two things in the world come to stand in a relation of sign and object not because of intrinsic relations between them, but because of the sensing by a third entity of relations between them (intrinsic or not). This

sensing can take the form of something we might call thought, or it can be more basic and experiential; but in either case it can be conceived as a calling *to* the third entity by the things that become sign and object that occurs simultaneously with a reverse calling of the things *by* that entity. A and B are called by entity C at the same time as they call it, and from this mutuality a signifying metarelation arises. The interpretant requires, on the part of the third entity, an *attentional* capacity, an ability to select from among the myriad stimuli received from its environment, some few to focus on and make special response to—some few, that is, to attend to. This attention depends in turn upon neural or cognitive systems of a certain complexity, and sign-making spans the living realm as far as we can find organisms endowed with such systems.

How far is this? I am not inclined to extend the semiosphere as far as many biosemioticians do, who identify sign-making by plants, microbes, and even intracellular molecules bound in genetic processes and metabolic cycles—DNA, for example, in a "semiotic" relation to transfer RNA and amino acids. In doing this, they ignore the fundamental Peircean insight and with it the all-important attentional interpretant, the cognitive concomitants of which suggest far more limited boundaries for the semiosphere. Trees, paramecia, bacteria, and (probably) sea urchins and flatworms do not *attend to*; they are non-semiotic organisms, while most vertebrates, including amphibians, reptiles, mammals, and birds, are sign-makers. The border between the semiotic and the non-semiotic is an uneven one, however, and can cut across individual phyla: within the mollusks, clams are non-semiotic, while cephalopods are accomplished semioticians.

This is not to deny that trees and paramecia and clams stand in hugely complex relation to their environments and the stimuli they receive from them. Theirs is not a semiotic relation, however, but an *informational* one, without interpretants or signs. Information, from the vantage of Claude Shannon[10] and the many outgrowths of his ideas developed since the 1940s, is a correspondence that manifests a condition of relationality—but not one of metarelationality. In Peirce's terminology, it is sheer secondness; in Jerry Fodor's happy phrase, "reliable causal covariance."[11] In discerning this informational realm we come to the largest category within which semiosis, sociality, technology, and culture are all nested. This topic, however, would take us far afield from deep human history, since the first hominins were not merely informational organisms, but semiotic, social, cultural, and technological ones as well. It is enough to note that living things, from the

simplest to the most complex, are all immensely intricate information processors; but only a small portion of them are endowed with the capacities to transform the relations of secondness into the metarelations of thirdness and thereby create signs.

2. Systems

To understand these relations of culture, technology, and semiosis is to begin to fashion a model of the final stages of human emergence. Hominin evolution from the outset combined culture and biology and, thus, was a *biocultural* evolution, its selective dynamics determined in some part by the shifting natures and balances of the semiosis, cultural transmission, and technological expertise that different hominins commanded. These were the balances that shaped the relations between the assemblages of activities comprised in hominin taskscapes and the environmental affordances and constraints they entailed.

These relations themselves developed according to an interplay that has come to be called *niche construction*. This denotes an interactive dynamic in which organisms shape their environments even as their environments shape them, across many generations, through natural selection. Niche construction is not restricted to the evolution of hominins, of course, but instead is ubiquitous in the history of life. Its fundamental systemic pathway is a *feedback circuit*: organisms living out their lives alter their environments in large or small ways, and these altered environments ultimately bring altered selective pressures to bear on the organisms that have altered them. Genetically determined traits are advantageous or harmful differentially in relation to environments altered by the organisms that manifest them. Niche construction is a major aspect of the novel evolutionary thinking that has emerged over the last forty years or so and is referred to today as the Extended Evolutionary Synthesis, to distinguish it from the Modern Evolutionary Synthesis that first combined Darwinian selection with Mendelian population genetics in the 1920s and -30s and held sway through the middle of the last century.[12] Niche construction challenges evolutionists to take account not merely of life forms changed by successive adaptations on stable adaptive terrains—the special achievement of the Modern Synthesis—but also of the selective consequences of ecosystems shifted by the organisms living in them.

The semiotic, cultural, and technological capacities of hominins were all powerful elements in their building of taskscapes—that is, in their construction of niches. Evolutionists in the Extended Synthesis camp have worked to develop quantitative models of the impact of cultural transmission on human niches and, through the

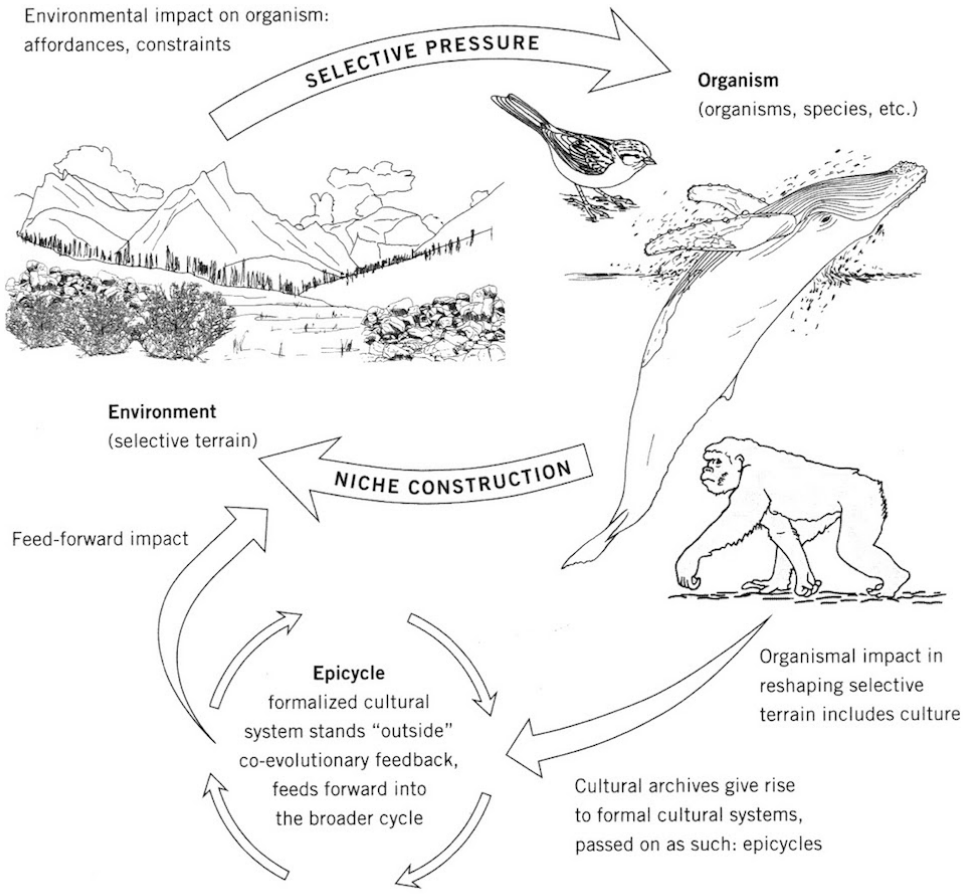
feedback loop, back onto the selective pressures of subsequent hominin evolution.[13] The general outcome of this effort has been to affirm the considerable power of cultural transmission and accumulation to alter the selective gradient. The cultural element in biocultural evolution, these models indicate, can change the nature of selection and thereby play a role in shaping the genomes of future generations.

But quantitative models are necessarily blunt in their conceptions of culture; not much nuance of cultural processes can be captured in the coefficients of recursion equations. The models take technology, in the form of shifting toolmaking industries, as a proxy for cultural change and its impact on the environment—as they must, since these industries are the chief evidence we have for long stretches of hominin evolution. What is missing from the models, however, is any notice of the changing semiotic means of the hominins in question across the last three million years, and specifically any awareness of their impact on culture. This is a major lacuna, because the semiotic changes introduced systemic novelties that rendered hominin niche construction different from any other in the history of earthly life. They brought about new dynamics operating on culture and the material aspects of the taskscape, and from these arose new kinds of relations of hominins to their environments.

The systematization of hominin culture began early. It can be glimpsed already in design consistencies of Acheulean biface industries, which first show themselves about 1.75 million years ago. Systematization accelerated and took off as a decisive factor, however, only in much more recent times, probably well after the 500,000-year mark. The acceleration, I argue, was driven by the agglomeration of signs into ordered arrays; this was the semiotic novelty that began to set hominin niche construction apart. The evidence afforded by both archaeological reconstructions of these societies and modern ethology suggests that the kinds of signs central to this stage were *indexes*, signs related to their objects by proximity, contextual connection, causal relation, and in general by a deictic, pointing operation. The pointing aspect of tools I noted before manifests such indexical semiosis, and the increasing complexity and hierarchic organization evident in toolmaking procedures in the period of Neandertals and the immediate ancestors of sapients are a reflection of the growing systematization of indexes.

The accumulating, ordered arrays of indexes inaugurated what I have called a *hyperindexical* stage of hominin culture,[14] characterized by heightened systematization of both action and communication without modern language or symbolic cognition. This

was an era of protolanguage or protodiscourse, of protomusic, and of nascent ritual—understood in a broad sense as the performance of more-or-less fixed and repeated collections of signs pointing to things beyond immediate, sensible perception. As systems of indexes took shape, the impact of semiosis on hominin taskscapes was recast. At first sporadically and later with increasing regularity, the sign-systems acquired an autonomy and stability in relation to the feedback loops of niche construction from which they had arisen. Initially these features were weak, nothing more than products of the repeatability of the actions enabled by the semiotic systems. Eventually they grew to be something more: stable, hierarchic arrangements of signs guiding, from a position somewhat apart, the ongoing feedback cycles of niche construction. These products of hominin semiosis and culture were new to the world, since the more basic semiosis of many other animals and the rudimentary cultures of some few of them did not rise to a systematicity that could create them. The stable complexity of the semiotic and cultural systems of late hominins caused them to stand apart from the feedback cycles of niche construction, and for this reason I have termed them *epicycles*.[15]



Epicyclic Biocultural Coevolution. Chart by Virge Kask. Published in Garry Tomlinson, A Million Years of Music, Zone Books, 2015.

The semiotic and cultural epicycles of early humans—of ancient *Homo sapiens*, of Neandertals, perhaps of their common ancestor *Homo heidelbergensis*, and no doubt of some other less well known late hominin groups—reshaped niche construction at a basic, processual level. The role of humans in it took on a new aspect, above and beyond the feedback relation to their environments they shared with the niche construction of all other organisms. Now feedback processes joined with semiotic systematization to give rise to control mechanisms directing niche constructive cycles from the outside. Such external controls are not feedback at all, whether positive or negative; instead they are *feedforward* elements. Feedforward had always been important in niche construction: climatic variations, geological changes ranging from volcanism to tectonic plate movements, and astronomical cycles are all feedforward elements in relation to the niche

construction of earthly organisms. But now, by virtue of the semiotic and cultural powers of early humans, niche construction had spawned from *within* its dynamic a new kind of feedforward control.

The consequences of semiotic and cultural epicycles were immense, nothing less than the advent of human modernity. They could exercise such profound effects because as they formed, they shifted the relations between evolving humans and elements in their environments. These shifts were often categorical ones, in which the epicycles (new kinds of controls) brought humans into interaction with new categories of constraints and affordances, unmet and untapped by earlier taskscapes. Because of this potential, the formation of an epicycle could have a liminal impact, defining a threshold or boundary across which lay new horizons in the interactions of humans and the world. The most powerfully transformative epicycles in this way brought "on line" whole new sets of criteria governing the relations of evolving cultural systems to their environments. They opened human access to new possibilities in the interactions of minds, bodies, and the materials of the taskscape, and they made this access a part of ongoing niche construction and biocultural evolution.

When in the 1990s John Maynard Smith and Eörs Szathmáry discerned several "major transitions" in the evolution of life on earth—threshold crossings that inaugurated new horizons of possibility in the course of evolution—they included the advent of human modernity as the latest example.[16] They worked to explain this transition as the product of human language and its social potentials, but their explanation failed to reach the broadest and deepest change that humans brought to the course of evolution, of which language was only one outcome, however important. By introducing feedforward controls generated from within niche-constructive feedback, semiosis and culture exploded humans' potential to alter their taskscapes, propelling them toward new social and material horizons. The distinctively human threshold crossings that resulted were irreversible, just like the other major transitions: not because of some ineluctable human progress, but because it is the nature of the abstract machine of biological and biocultural evolution—the Darwinian algorithm of inheritance, variation, and selection—to explore every search space that is opened to it. Feedforward epicycles expanded exponentially the search space in which selective forces could act on late hominins.

3. Beads

Bead-making offers a modest but clear example of the threshold effects of a cultural epicycle. With this phrase, archaeologists denote a technology that took many forms and appeared across a wide geographical range, starting in all likelihood more than 100,000 years ago. In all forms of bead-making, resources of the taskscape were drilled through or punctured, often with labor-intensive care, so as to be hung on straps, hair, or clothing. The materials used ranged widely according to different local taskscapes and include shells from harvested mollusks, ostrich eggshells, ivory, teeth from hunted animals, amber, and minerals. The goal of bead production, known from some relatively late cases (ca. 20-30,000 years old) and inferred for earlier instances, was to mark social distinction in one form or another, asserting status or power, granting access to special things or privileges, and in general betokening difference either from others in a group or from other groups. The bead industry seems to have emerged independently in many places humans went after a certain point in their evolution, perhaps even involving more than one species.[17]

Why was this technology so fecund and widespread? The answer lies in the irreversible crossing of a threshold, driven by a semiotic/cultural epicycle. The beads, viewed collectively as a unified industry, share little beyond two things: a technological operation unremarkable in itself, in that it is indistinguishable from similar processes used in making tools and weapons; and a foundational semiotic innovation which, once introduced, transformed this general operation. The combination made the beads powerful signs, indexes of the social order and complexity they marked. But the beads could not have become signs and the old technology could not have been redirected along a new path without a systematized indexical order already in place. The social complexity calling for material tokens and manifested in the beads was itself a product of the gathering of semiotic systems in the hyperindexical age. Once the semiotic foundations of such complexity were in place, the slight swerve of technologies to enlist material resources that could manifest them was a likely, almost inevitable development. Tried and true techniques were recruited for new ends glimpsed only because a hyperindexical threshold was crossed.

More specifically, once the material byproducts of hunting, harvesting, and scavenging came to be indexes of something else, both the processes of their collection and the materials collected were transformed. A shell collected on the southern African seacoast was no longer merely the waste product of a meal, to be tossed onto a midden outside the cave, and its collection was no longer a matter of sustenance only; the tooth of a wolf

or hyena killed while scavenging a carcass was no longer an incidental byproduct of subsistence. In each case a material aspect of the taskscape had been transformed by virtue of a threshold crossing, to become a sign-in-the-making. The shell or tooth was transmuted from non-signifying to signifying matter, and a process of production was endowed with novel semiotic powers by virtue of its place in the epicycle. And, once the transformation had occurred, there was no undoing it—no revoking of the semiotic *potential*, no matter how many times it was not exploited (the shellfish eaten, the shell tossed away).

The *feedforward control* here—the *epicycle*—consists in a set of semiotic conditions determining these new roles for actions and resources, and thereby turning niche construction in new directions and remapping humans' alterations of their niches. The epicycle brought about not merely an enrichment of the taskscape, but its opening out to new potentials, new horizons of possibility for its further elaboration; these were taken into the machinery of niche-constructive, biocultural evolution. In the instance of bead-making, this opening involved remaking affordances into new kinds of affordances. Other epicycles confronted humans in new ways with constraints, generating new possibilities, then, from the transformation of limits. I have elsewhere described such epicycles behind the human processing of discrete pitch in musicking (a transformation of informational constraints) and the emergence of propositional syntax in language (a transformation of semiotic constraints, as analyzed by Deacon).[18] But in all three cases and in many others the operational dynamic of the epicycle was the same: a system generated from within niche constructive feedback cycles came to operate as a mechanism controlling the cycles that gave rise to it; thresholds emerged and were crossed; and new search spaces widened the scope of humans' biocultural evolution.

Footnotes

1. This essay extends a discussion launched in my book *A Million Years of Music: The Emergence of Human Modernity*. New York: Zone, 2015. Print. It also anticipates a broader treatment of the issues in a new book: *Culture and the Course of Human Evolution*, forthcoming from The University of Chicago Press, 2018.

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6. Tim Ingold. "The Temporality of the Landscape." *World Archaeology* 25 (1993):152-73. Print.

7. Juri Lotman. "On the Semiosphere." *Sign Systems Studies* 33 (2005): 205-29. Print.

8. Terrence Deacon. *The Symbolic Species: The Co-evolution of Language and the Brain*. New York: Norton. 1997. Print; Terrence Deacon. "Beyond the Symbolic Species." *The Symbolic Species Evolved*. Eds. Theresa Schilhab, Frederik Stjernfelt, and Terrence Deacon. Berlin: Springer, 2012. 9-38. Print.

9. See Paul Kockelman. *Agent, Person, Subject, Self: A Theory of Ontology, Interaction, and Infrastructure*. Oxford: Oxford University Press, 2013. Print.

10. Claude E. Shannon and Warren Weaver. *The Mathematical Theory of Communication.* Urbana: University of Illinois Press, 1949. Print.

11. Jerry Fodor. *A Theory of Content and Other Essays*. Cambridge, MA: MIT Press, 1990. 93. Print.

12. F. John Odling-Smee, Kevin N. Laland, and Marcus W. Feldman. *Niche Construction: The Neglected Process in Evolution*. Princeton: Princeton University Press, 2003. Print; Kevin N. Laland, Tobias Uller, Marcus W. Feldman, Kim Sterelny, Gerd B. Müller, Armin Moczek, Eva Jablonka, and John Odling-Smee. "The Extended Evolutionary Synthesis: Its Structure, Assumptions and Predictions." *Proceedings of the Royal Society B* 2015. Web.

13. See for example Robert Boyd and Peter J. Richerson. *Culture and the Evolutionary Process*. Chicago: University of Chicago Press. 1985. Print; Odling-Smee, et al. *Op cit.* 2003; Luke Rendell, Laurel Fogarty, and Kevin N. Laland. "Runaway Cultural Niche Construction." *Philosophical Transactions of the Royal Society B* (2011). Web.

14. Hyperindexicality is a matter first and foremost of the systematic and hierarchical arrangement of indexes in relation to one another, which brings them close to one of the characteristic features of the symbol. I discuss the presymbolic, hyperindexical stage of late hominin evolution in *Culture and the Course of Human Evolution*, *Op. cit.* 2018. Especially Chs. 4, 5, and 7.

15. For further discussion see *Ibid.* Chs. 5 and 7.

16. John Maynard Smith and Eörs Szathmáry. *The Major Transitions in Evolution*. Oxford: Oxford University Press, 1995. Print.

17. Francesco D'Errico and Marian Vanhaeran. "Evolution or Revolution? New Evidence for the Origin of Symbolic Behaviour In and Out of Africa." *Rethinking the Human Revolution*. Eds. Paul Mellars Katie Boyle, Ofer Bar-Yosef, and Chris Stringer. Cambridge: The McDonald Institute, 2007. 275-86. Print; and Marian Vanhaeren and Francesco d'Errico. "Aurignacian Ethno-Linguistic Geography of Europe Revealed by Personal Ornaments." *Journal of Archaeological Science* 33

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18. See Gary Tomlinson. *Op. cit.* 2015. Chs. 5 and 7 and *Op. cit.* 2018. Chs. 5 and 7. For Deacon on semiotic constraints and symbolism, see *Op. cit.* 2012. 20-25.

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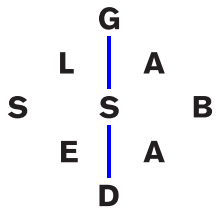


JOURNAL > SITE 1: LOGIC GATE, THE POLITICS OF THE ARTIFACTUAL MIND | 2017

Anti-Eureka

Matt Hare,

Ben Woodard

> *"In their spoken language, a noun has a case marker indicating whether it's a subject or object. In their written language, however, a noun is identified as a subject or object based on the orientation of its logogram relative to the verb [...]. I'll bet you that learning their two-dimensional grammar will help you when it comes time to learn their mathematical notation."*
> *"You've got a point there. So, are we ready to start asking about their mathematics?"*
> *"Not yet. We need a better grasp on this writing system before we begin anything else," I said, and then smiled when he mimed frustration. "Patience, good sir. Patience is a virtue."*[1]
> *It would be easy to worry unnecessarily about the feasibility of the matter. It is impossible, someone might say, to advance science with a conceptual notation, for the invention of the latter already presupposes the existence of the former. Exactly the same difficulty arises for [ordinary] language. This is supposed to have made reason possible, but how could man have invented language without reason?*[2]

The proposal for an ideal language manifests itself as a problem concerning the order of creation. Chiang's short story renders this as a paradox by asking how beings born within time could invent a language which took them outside of it—but more about that later. Our intention is rather to take the construction of ideal language as a case of a more general tension between two schemas of genesis: the empirical and the formal.

By the *empirical schema*, we name the factual order by which a subject or subjects come to know anything at all, or, simply to develop representations about the world. We are thus using the term empirical in a broader sense than we might take it in the context of classical empiricism, where it indexed the methodological principle of grounding theory in experience. Rather, we use it to refer in a quite blanket manner to the *located* character of concept formation, its history, the "fact" that knowledge is situated. Nevertheless, the reference to empiricism should be allowed to linger, for it was Hume who so valiantly attempted to reduce all ideas to the content of experience, as a consequence developing an account of skepticism as the methodological realization that the "leaky weather-beaten vessel"[3] of our situated faculties was all that we had to rely upon on in this sea of concepts.

Our second schema is difficult to define other than negatively, as it concerns the degree to which the process of thinking can be said to grasp or, more radically, be dependent upon, that which is *outside* of that process. Naming this the problem *of the formal* has a certain polemical valence, highlighted by the discussion of ideal language, but we could also call it the question of the relative autonomy of concepts. This would be consistent with a conception of philosophy as historically wagered upon the possibility of this autonomy, the hope that the factual equation of concepts and facts is false. If we return to these quite traditional problematics, it is because we believe that many contemporary debates surrounding philosophical authority might be more fruitfully reorientated as questions about a potential disjunction between the *generation* and *content* of concepts. The immediate problem is that this disjunction remains vacuous so long as the putative autonomy of conceptual content is only defined in a general manner as the degree of abstraction from an empirical reference base. Rather, what is required is a method of analysis that allows conceptual invariance to emerge progressively across different domains. Such a method is proposed by Swoyer under the name *surrogative reasoning*, in which different *structural representations* are marshalled in order to exhibit a mappable consistency of relations between said representations. Swoyer seeks to generalize the function of *expression* in the Leibnizian sense, wherein, for example, "the model of the machine expresses the machine" or "the projective delineation on a plane expresses a solid".[4] In Swoyer's language, the expression stands for the expressed as a *surrogate*. Such reasoning via the expression or surrogative relation was proposed by Leibniz as a mode in which:

> *… [W]e can pass from a consideration of the relations in the expression to a knowledge of the corresponding properties of the thing expressed. Hence it is clearly not necessary for that which expresses to be similar to the thing expressed, if only a certain analogy is maintained between the relations.*[5]

In extending Leibniz's account, we take Swoyer to advance a measurement theoretic account of philosophy as dialectic between *artifact* and *invariance*. However, the distinction between the invariant and the artifactual is itself fraught, and in many ways, turns upon the above mention of a "certain analogy," and its distinction from similarity. Leibniz is here using "analogy" in the sense of maintaining proportion, which we name here as invariance, and this must be distinguished from a more contemporary sense of analogy as simple resemblance, founded on the perception of empirical continuity. Only following such a distinction can we claim to demarcate a notion of surrogacy which is informative rather than obfuscating. Indeed, as Swoyer insists, there is a trivial sense in which "with sufficient perseverance—or perversity—we can use anything to represent virtually anything else."[6] In other words, philosophy is haunted by the threat of an analogical overextension, of constructing a *lingua universalis* in which all "content" is an artifact. In order to cleave invariance from artifact, analogy must be constrained. For Swoyer, this involves a formal notion of "shared structure"[7] that can localize invariance as preservation of relevant structure across different representational systems, whilst discarding artifacts as those features for which no consistent mapping obtains.

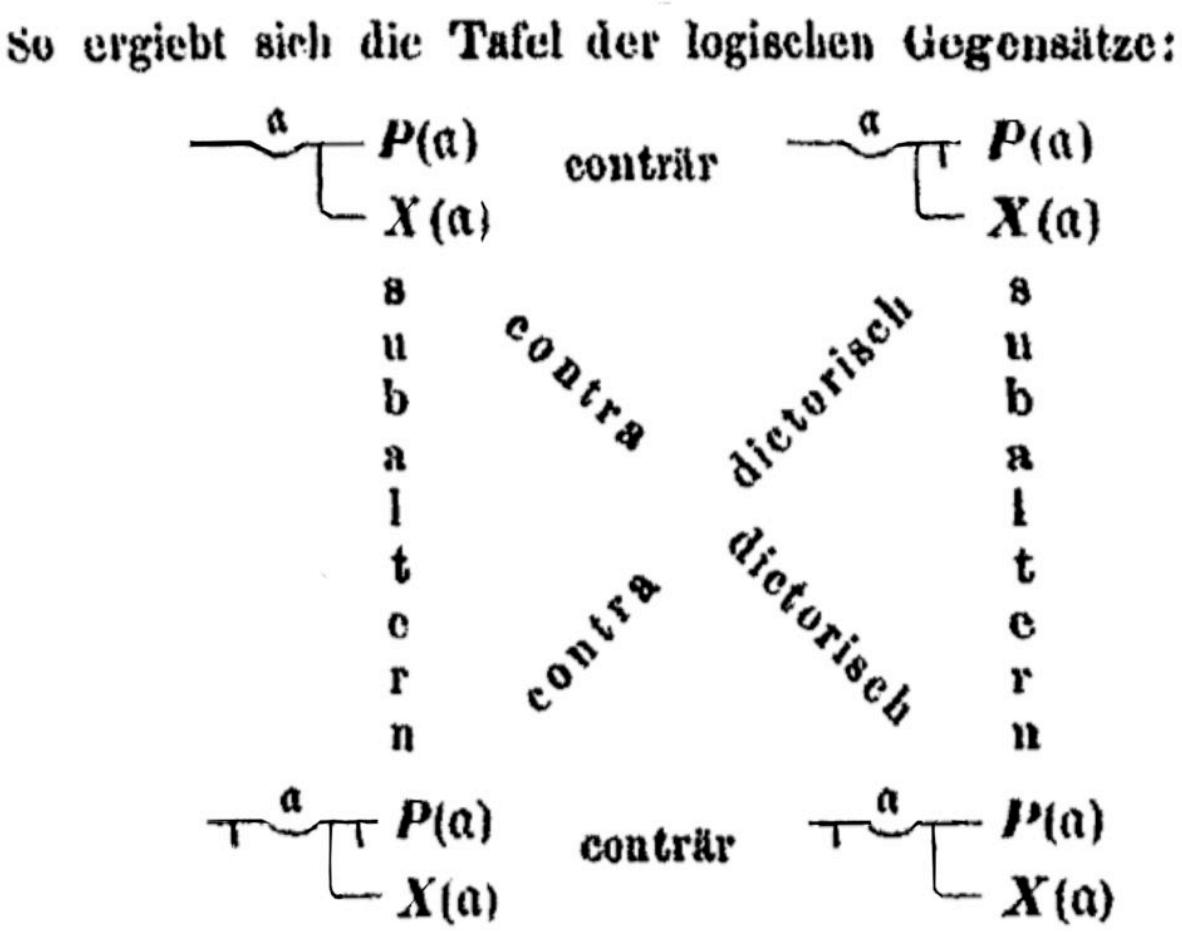
It is insofar as this formal constraint of structure is to be articulated using *formalism* that we arrive at the problem of ideal language. This should be differentiated from the debate around "mathematical platonism." Whereas the "platonic" problematic concerns the seeming necessity of ontologizing the purported "objects" of formalism, resulting in endless ratiocinations around the status of "numbers" or "the abstract general idea of a triangle," the puzzle of ideal language concerns the degree to which it is necessary to reify a particular formal structure as the condition of legibility for inter-representational invariances. The aim of ideal language is not to cut nature at the joints, nor simply to do the same for concepts, but rather to give the conditions of identity for concepts across the different representations in which they appear. It is precisely this dynamic which is illustrated by the fact that the structure of surrogacy on Swoyer's account turns out to always be a *doubled* structure, in which the generalized expression or surrogate relation holds only between different idealized models of the domains in question, and this must be supported by a certain opaque idealization of a particular formal apparatus. What this

seems to point to is the paradoxical structure of surrogative reasoning: the institution of an ideal formal language appears as the *precondition* of legibility for the very notion of surrogacy.

In this manner, Swoyer's project points to a dynamic inherent to the deployment of formalism in the investigation of the formal, that of *reified artifactuality*. The ever-present shadow of the philosophical deployment of formalism is that the idiosyncratic features of a representational system are illegitimately extended when they are taken as irreducible, and hence given a chimerical purchase outside of the domain in which they developed. This problem of reified artifactuality is a useful way of framing the pitfalls inherent to both schemas of genesis: the empirical schema is reified when an identity is assumed between conceptual content and the conditions of generation, the formal schema is reified when the validity of ideal representation is assumed, by fiat, as governing.

This might appear as a critique of the philosophical crutch of formalism. The matter is not so simple, for the crux of the difficulty is that the analogical structures of natural language are no less reified in philosophies that seek to bypass formalism. What, for example, are Hume's principles of association—resemblance, continuity, cause and effect—if not a reification of the linguistically mediated associations inherent to the natural attitude? It is precisely this point that was most viciously attacked by Frege in his numerous critiques of the manner in which empiricism had developed into a dominant and anti-philosophical strain of scientifically-minded naturalism.[8] We can focus here on two points that were fairly consistent across Frege's writings. The first concerned the impossibility of experience alone—and its philosophical sedimentation in empiricism—overcoming the incessant flow of sensory input, the manner in which "[t]he vivacity of sense-impressions surpasses that of memory-images."[9] It is this unfortunate fact which requires the deployment of concepts as a kind of stabilizing function on experience. The philosophical investigation of these concepts quickly runs into a second, more insidious foe: its reliance on natural language, which imports into thinking an architecture foreign to concepts owing to an after-image of speech. Thus, "a great part of the work of a philosopher consists—or ought to consist—in a struggle against language."[10] Although Frege never stated it so bluntly, we could almost say that insofar as philosophy proceeds solely within natural language, it does not even think. Nevertheless, it was clear that even in cases where thinking deployed formal symbols to combat these empirical weaknesses, an initial reliance on experience was coded into the very *sensible* nature of those symbols. Frege thus acknowledged that we were stuck with

the “leaky vessel” of the faculties, but took the opposite lesson from this than Hume, asking how it was that we could use “the realm of the sensibles to free ourself from its constraint,” to make something of the fact that “[s]ymbols have the same importance for thought that discovering how to use the wind to sail against the wind had for navigation.”[11]



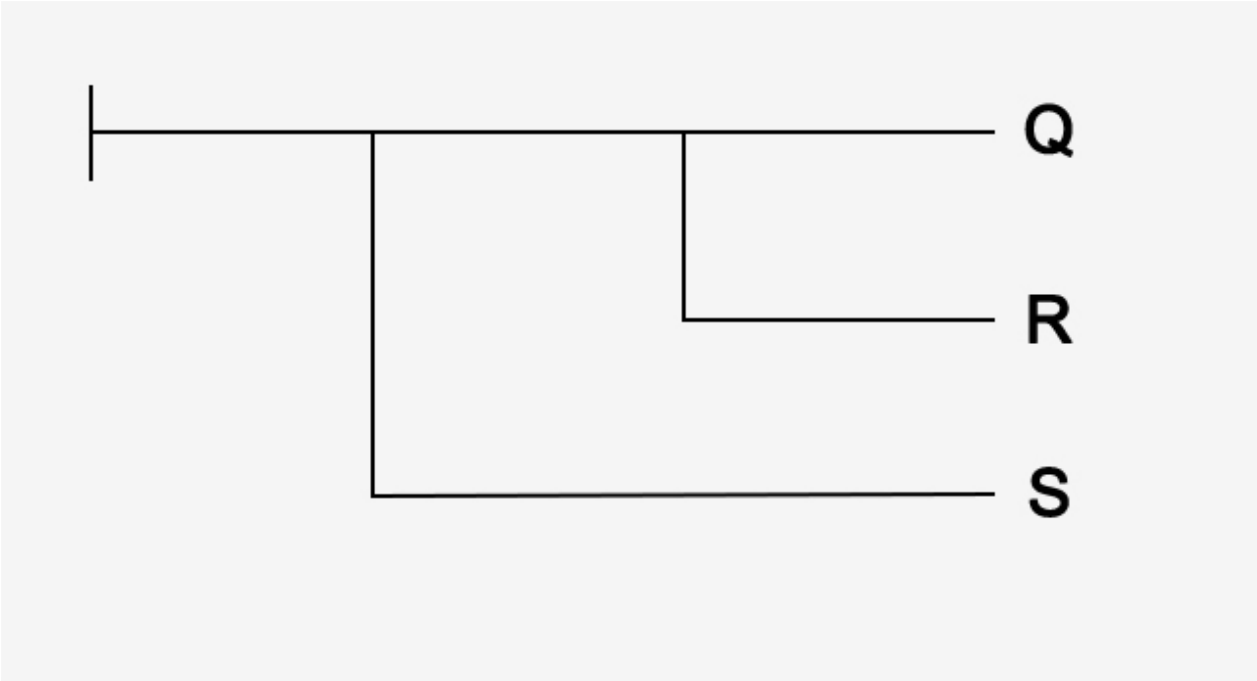
Gottlob Frege’s “square of opposition”, taken from “Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens”, Halle a/S: Verlag von Louis Nebert, 1879.

For the next step, Frege was going to need a bigger boat: the *Begriffschrifft* or conceptual notation (literally, “concept-script”). According to Frege, the crucial failing of past attempts to give expression to logical rules governing the formation and relation of concepts was that these rules were invariably “external to content.”[12] This is to say that, on the one hand, they imported a subject/predicate structure from natural language, obscuring the character of concepts as *unsaturated functions*—for which mathematical

concepts are the paradigmatic example—and, on the other, they relied on breaking concepts up into successive concatenations, the inferences between which remained ambiguous and prone to error:

> *In this respect, [ordinary] language can be compared to the hand which despite its adaptability to the most diverse tasks is still inadequate. We build for ourselves artificial hands, tools for particular purposes, which work with more accuracy than the hand can provide. And how is accuracy possible? Through the very stiffness and inflexibility of parts the lack of which makes the hand so dexterous. Word-language is inadequate in a similar way. We need a system of symbols from which every ambiguity is banned, which has a strict logical form from which the content cannot escape.*[13]

Collapsing the illusory distinction between form and content would thus require the development of what Frege would later call a *Hilffsprache*, an artificial or *surrogative* language.[14] The method by which the project for a *Begriffschrifft* pursued this ideal was by undermining the order of succession inherent to the articulation of thoughts in natural language, and which has persisted in the dominant forms of propositional logic in the 20th century. To give an example, in first-order propositional logic we can express the syllogism a) "if S, then if R then Q" as "S → (R → Q)," and the syllogism b) "if S and R, then Q" as "(S & R) → Q." In turn, we can express the formal equivalence of a) and b) by writing c) "S → (R → Q) -||- (S & R) → Q." However, the latter is something which has to be *proved*; it is not immediately evident from the expression of a) or b). In contrast, these propositions can all be written in a single *Begriffsschrift "*sentence" as follows:



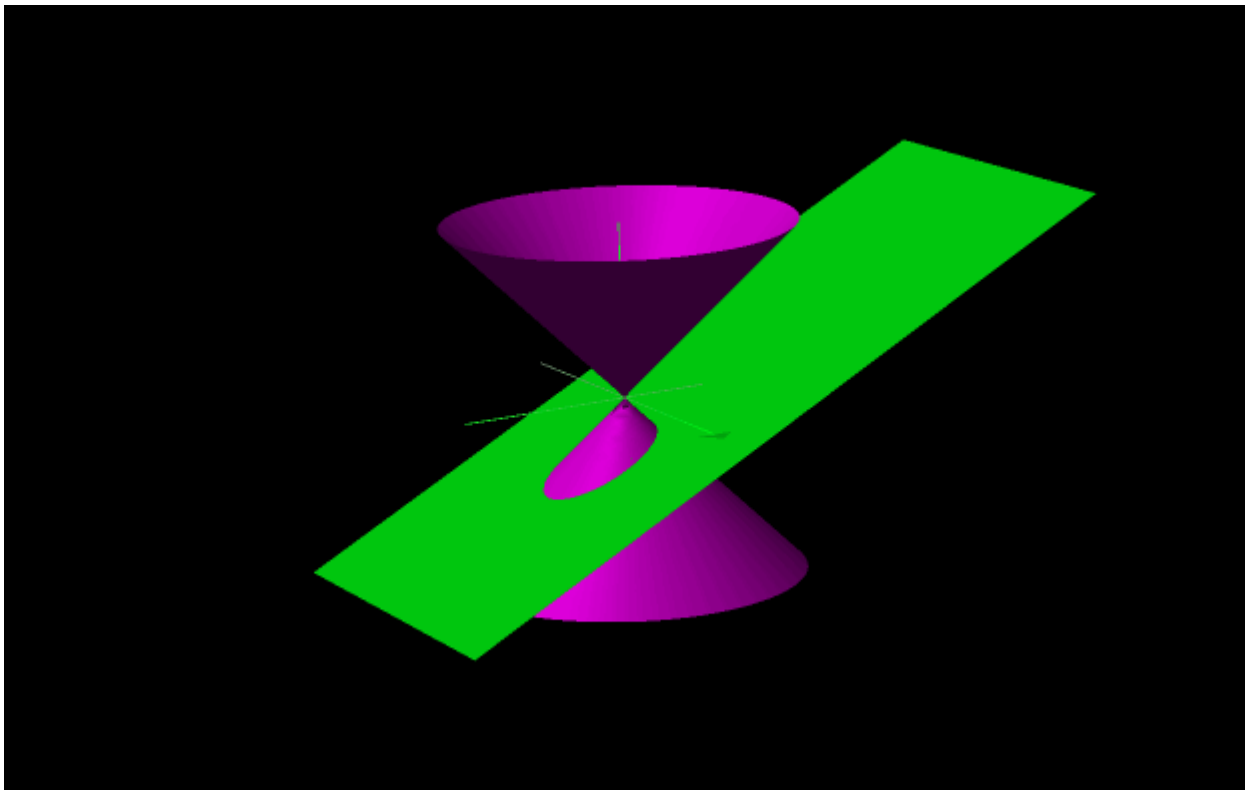
Whether we read a), b) or c) out of this sentence will depend precisely on the "reading" adopted, but they are all presented mutually as its content. A *Begriffsschrift* sentence of this type is hence an abstract prism of logical relations, through which different linear interpretations are refracted relative to an analysis.

It is this synthetic role which is emphasized by Macbeth in *Frege's Logic*, an appropriately named work, since the book is a narrative in which the protagonist is not, properly speaking, Frege himself, but rather his formal notation. There is a mirroring between the form of the narrative which Macbeth gives and the form of the script itself: the ideal language of the *Begriffsschrift* emerges as site where the angles of approach to its content, even Frege's own, are ultimately erased. The key to this reading is the claim that Frege's notation is in fact not a *Begriffsschrift* at all, but, developing from Frege's later distinction between sense [*sinn*] and reference [*bedeutung*], a *Sinnschrift*, a presentation of the content of senses. In Macbeth's language, what the notation objectively presents is not *concepts* but *conceptions*—conceptions that, although historical, can be rendered properly "objective" as senses in their written presentation, insofar as Frege's script allows us to write them in a form which would be the same for any being capable of grasping them. On Macbeth's reading, the lesson of the *Begriffsschrift* is that logic "is a science like any other" because "no more than in any other science is it simply *given* what the basic logical concepts are or how best to conceive them."[15] In other words, it is because logical concepts are not transparent to reason that Frege's notation can fulfill the ideal of a science of logic in which:

> *Our conceptions of things, the medium through which they are grasped by us, can become transparent to us in a fully axiomatized system, but such conceptions must be distinguished in principle from the concepts we seek to grasp by their means. We can make mistakes.*[16]

This picture is highly suggestive. However, the realization of Frege's ideal language in a historically localized form of writing exemplifies what we earlier called the problem of reified artifactuality. The distinction that Macbeth draws, between historically located but nonetheless objectively presentable conceptions and strictly transhistorical concepts seems to be a necessary one for articulating the purchase of a project like Frege's *Begriffsschrift*. Thus, *what* Frege's language writes is the situated objectivity of conceptions *as* a full-fledged realization of objectivity, a standpoint of knowing understood as a stabilization of different relations of mediation. Macbeth's perspective aligns with our earlier sketch of Swoyer, wherein the achievement of the ideal is, in effect, the realization of invariance. Yet, given that such invariance is simply invariance across historically situated conceptions, it seems that Frege's script ultimately reifies a particular historical form of understanding, transforming generation *into* content via a systematization of the former. Any access afforded to the timeless nature of concepts remains riddled with artifactuality.

Our concern then is the sufficiency of thinking formalization's relation to content without merely side-stepping genesis as such, a point of tense contact between Frege and the experiments of Châtelet, who excavated a philosophy of formalism latent within the legacy of German Idealism, in particular Schelling's *Naturphilosophie.* It was Schelling who sought to think the imbrication of the formal and the natural in order to avoid the traps whereby the attempt to locate *where* thought takes place all too often leads to trial by anti-Platonism, thereby foreclosing alternative means of articulating an autonomy of the concept, the idea, or the formal. It is important not to assume that Schelling merely imparts thought to nature. Rather, the project of *Naturphilosphie* is one in which, from the point of view of thought, nature should be treated as thought-matter, even though it requires *our* mental activity.



Rendition of a "conic section", a concept used by G. W. Leibniz to illustrate surrogative reasoning.

Here, we might posit a certain structural analogy between Schelling and Frege in trying to think the consequences of the assertion that thought is not *in* the head. For Schelling, "[n]ature's highest goal to become wholly an object to herself is achieved only through the last and highest order of reflection, which is none other than man; or, more generally, it is what we call reason."[17] Yet, reason is not, pace Kant, the lord of all thought, but merely the faculty that draws conclusions. Along similar lines, Frege finds the essential value of the externalization of thinking in notation in the fact that seemingly mechanistic manipulation of numbers in formal systems "only becomes possible at all after the mathematical notation has, as a result of genuine thought, been so developed that it does the thinking for us."[18] A syncretic axis drawn through Schelling and Frege would thus insist on the artifactuality of all actually existing thought processes: thought is an artifact of nature in a similar manner that thinking is an artifact of the "genuine thought" glimpsed in external formalization.

It is the inseparability of the logical from the natural that is taken up by Châtelet's deployment of the diagram, in that the diagram *finds* thought partially by exhibiting it as properly dynamic. Châtelet writes in *Figuring Space*:

> *In its ordinary functioning, science seems to limit itself to the gestures that guarantee the preservation of knowledge and leave undisturbed the patrimony of those that set it alight and multiply it. Those are also the ones that save it from indefinite accumulation and stratification, from the childishness of established positivities, from the comfort of the transits of the "operational" and, finally, from the temptation of allowing itself to be buckled up in a grammar. They illustrate the urgency of an authentic way of conceiving information which would not be committed solely to communication, but would aim at a rational grasp of allusion and of the learning of learning. The latter, of course, would be far removed from the neuronal barbarism which exhausts itself in hunting down the recipient of the thought and in confusing learning with a pillaging of informational booty. Schelling perhaps saw more clearly: he knew that thought was not always encapsulated within the brain, that it could be everywhere, "outside … in the morning dew."*[19]

There is no obvious agreement between Frege and Châtelet here, but we can situate both as attempting to go beyond the limits of thinking through thought via inventive attempts at modeling immanent relations and the behavior of concepts. We might say that Châtelet presents us with an extreme case of this trajectory, one which touches upon the problem of the hard limit of expressibility and exhibition. Whilst this is often taken up in a poetic mode (that is, of breaking language with language), Châtelet's attempt at "touching" the outside through the diagram represents an alternative to Frege's deployment of the *Begriffsschrift*. The creatures of diagrammatic space are formal entities that not only express a concept but express their own construction in their very form. This invocation of the outside by way of an engagement with the diagrammatic must, however, immediately be shorn of any categorization as either naive romanticism or anti-formal expressionism. As a positive construction, Châtelet invokes *Naturphilosophic* method as a model of the experimental consequences of the formal on the formal and the nonformal simultaneously in the context of post-Newtonian field physics. But, at the same time, if the danger in Frege/Macbeth was a reified artifactuality, the danger in Schelling/Châtelet is a trivial genesis.

An orientating tension here concerns the ways in which Frege and Châtelet deploy the philosophical notion of containment, and the influence this has on how they aim to keep one foot (or one hand) always in the world of experiential content. Just to compare:

> *The expression "grasp" is as metaphorical as "content of consciousness." The nature of language does not permit anything else. What I hold in my hand can certainly be regarded as the content of my hand: but all the same it is the content of my hand in quite another and more extraneous way than are the bones and muscles of which the hand consists or again the tensions these undergo.*[20]

For Châtelet, however, the auto-spatiality performed by the use of diagrams demonstrates "a revenge of the hand" which presents a notation which "contaminates to some extent the calculations, in order to create a new context like literary metaphor."[21] In both cases, content and form are playing in a diagonal, or ingrown space, between inside and outside, and it is this thought which Châtelet wishes to emphasize through his use of the concept of *extainment*, recently advanced by Grant in a series of texts highlighting the connection between Châtelet and Schelling.[22] Effectively, extainment makes explicit the difference between representation as expression and representation as exhibition, a difference modeled in turn by Schelling's reconceptualization of the subject/predicate relation as one of ground and consequent. Keeping in mind Frege's grasp and Châtelet's avenging hand, Grant's emphasis on Schelling's *Naturphilosophie* aims at describing a process whereby exhibition is not merely one thing expressing another smoothly, but an asymmetrical identity relation[23] whereby the second exhibited element expresses what was *in* the first while the second element is only possible by treating the first element as its ground.[24] The consequent can only be what it *is* by having the particular ground that it has, but it must differentiate itself from that ground in order to be a consequent.

Still from the film “Arrival” (2016) by Denis Villeneuve.

Thus, while containment expands the ground to engulf what has issued from it, extainment expands ground in order to exist as consequent, and, thus, the idea of the ground productively changes along with the topologically unpredictable behavior of what has emerged. Thus, the lesson which Grant seeks to draw from the Châtelet quote above regarding thought being in the morning dew is that “thinking is done in a nature whose nature is not boxed in, but boxed out. Exhibition, therefore, is the exhibition of precisely what is thought when what is doing the thinking is outside, everywhere.”[25] Perhaps as an imperfect reversal of Frege’s comment on how to think in a language before inventing it, the fact that conceptually grasping is imprecise is what makes it productive, not only intersubjectively, but in terms of any concept’s autonomy. Our concern is thus: what does conceiving formalism as a figure of *surrogative autonomy* tell us about the genesis of the formal? There are no simple answers here, but Chiang’s “Story of Your Life,” with which we began, dramatizes the problem. Chiang’s narrative follows a linguist charged with deciphering the script of alien visitors, the Heptapods. The fundamental challenge she faces stems from a feature of this language which we have already touched upon, namely that the written language of the aliens (Heptapod B) is radically disjunct from their spoken language (Heptapod A), in a manner opposed to the normal function of human inscription. Heptapod B seems to correspond to an order of cognition quite distinct from linear speech—one that poses a barrier to human comprehension because its writing seems to require a break from the temporal order of

empirical thinking: in order to "write" a sentence in Heptapod B, you must already *know* exactly how it will end. The "problem" of the story, as we read it, is thus the relationship between construction and intelligibility. For Chiang's protagonist, the conditions of linguistic construction in Heptapod B are unintelligible, and thus the script appears as radically exterior. This appearance of exteriority, however, is a result of the epistemic standpoint of the human interlocutor, and as readers our interest immediately turns elsewhere: how did the aliens *write* this thing? It is this pole of construction which effectively vanishes in *Arrival* (2016), the recent film adaptation of Chiang's work, a charmless fable in which aliens gift humanity with the *Begriffsschrift* in order to save the nuclear family. Everything objectionable about the film's "only Kang and Kodos can save us now" drama of transcendental-linguistic xenophilia is condensed in a scene inserted into the narrative, in which the linguist—a woman, of course—has to be transported into the alien's inner sanctum in order to receive cognitive rewiring through some mystical inception, the veritable *arrival* of the film's title. At this moment, the "learning of learning" the audience has been following is revealed to have been nothing but fertilizer for one thinking process to erase another. We could say that what is bypassed here is the problem of formalization as such, insofar as we are forced to assume a one-one mapping without genesis between thinking, writing, and thought, wherein the relation between different systems of conception can only be one of replacement.

The problem of surrogative autonomy is that thinking can quite readily formalize itself into a plethora of exteriorities, but that these will not necessarily be intelligible to it. All writing is at least a partial autonomization of thinking, but this fact is quite banal. The task is rather to try and develop the process of formalization as a model of transcendental reflection wherein thought is revealed *to* thinking through a mapping of relations back into the thinkable, a process which always teeters between a romance of the unintelligible and an acceptance of reified artifactuality. With respect to our title, we wish to avoid any cult of novelty as well as any dogmatism of formal control. The Châtelet-Frege axis we have sketched is thus intended to avoid two fairy tales: the former of a philosopher listening to the whispering dew for the sake of automatic writing (trivial genesis), and the latter of a massive computational hand gloved in implicative strokes that clutches all of sense and thought always and forever (reified artifactuality). There is a conflict between formal literacy and the scalability of reason over time and across thinkers in which thought—as grasped in the experience of a cognitive shift following a newly acquired conceptual or formal literacy—unnecessarily bears the halo of an event or

an alien arrival if we hold too strictly to either an empirical or formal schema of genesis. In other words, patience for the formal to *do its work* requires a certain abandonment of cause and assumptions about the formal in its supposedly *native* environment, the mind.

This paper was developed out of a workshop entitled "PS: Surrogat(IV)e Autonomy," as part of a broader series of events under the banner of "The Stubbornness of the Empirical" at Performing Arts Forum. We would like to thank our co-organizers and all other participants in that and other events in the series. Particular note should go to Lendl Barcelos, who introduced us to Swoyer's concept of *surrogative reasoning.* (#_ftnref25)

Footnotes

1. Ted Chiang. *Story of Your Life and Others.* New York: Tor, 2008. 131-135. Print.

2. Gottlob Frege. "On the Scientific Justification of Conceptual Notation." *Conceptual Notation and Related Articles.* Oxford: Clarendon Press, 1972. 89. Print.

3. David Hume. *A Treatise of Human Nature.* Oxford: Oxford University Press, 2000. 172. Print.

4. G. W. Leibniz. "What Is an Idea?" *Philosophical Papers and Letters.* Dordrecht: Springer, 1989. 207. Print.

5. *Ibid.*

6. Chris Swoyer. "Structural Representation and Surrogative Reasoning." *Synthese* 87 (3). Print; Dordrecht: Kluwer Academic Publishers, 1991. 452. Print. (For an extension of Swoyer's account, see "Leibnizian Expression." *Journal of the History of Philosophy* 33 (1), 65-99. Baltimore: John Hopkins University Press, 1995. Print.)

7. *Ibid.* Swoyer. 451.

8. For an excellent history on this point, see Hans D. Sluga. *Gottlob Frege*. London: Routledge & Kegan Paul Ltd, 1980. Print.

9. Frege. *Op. cit.* 1972. 84.

10. Gottlob Frege. "Sources of Knowledge in Mathematics and the Mathematical Natural Sciences." *Posthumous Writings.* London: Blackwell, 1979. 270. Print.

11. Frege. *Op. cit.* 1972. 84.

12. *Ibid.* 86.

13. *Ibid.* 86.

14. See the late fragment "Logical Generality" in Frege. *Op cit.* 1979. The distinction which Frege sets up in this essay, between *Hilfssprache* and *Darlegungsprache* (language of explanation or commentary—in short, the language of the philosophical text) is often translated through Tarski's later distinction between "object language" and "meta-language," but in the present context we find this to be an unhelpful importation.

15. Danielle Macbeth. *Frege's Logic.* Cambridge, MA: Harvard University Press, 2005. 154. Print.

16. *Ibid.*

17. F.W.J. von Schelling. *System of Transcendental Idealism*. Trans. Peter Heath. Charlottesville: University of Virginia Press, 1978. 6. Print.

18. Gottlob Frege. *The Foundations of Arithmetic.* Trans. J.L. Austin. Evanston: Northwestern University Press, 1980. xv-xvi. Print.

19. Gilles Châtelet. *Figuring Space: Philosophy, Mathematics, and Physics.* Trans. Robert Shore and Muriel Zagha. London: Springer, 1999. 14. Print.

20. Frege. "Thoughts." *Collected Papers on Mathematics, Logic and Philosophy*. London: Blackwell, 1994. 368. Print.

21. Gilles Châtelet. "Interlacing the Singularity, the Diagram, and the Metaphor." Ed. Charles Alunni. *Virtual Mathematics: The Logic of Difference*. Ed. Simon Duffy. Bolton: Clinamen Press, 2006. 36. Print.

22. *Extainment* is Grant's translation of Châtelet's use of *extimité* taken from Lacan's seventh seminar. While usually translated as *extimacy* in an attempt to override the psychical division of inside and outside, Grant follows the topological traces and opposes to it containment in the form of extainment.

23. Following terminology introduced by Gabriel Catren, we might say that what is at stake here is not so much a relation of identity as one of identification. See "Klein-Weyl's Program and the Ontology of Gauge and Quantum Systems" (forthcoming).

24. Iain Hamilton Grant. "The Law of Insuperable Environment: What Is Exhibited in the Exhibition of the Process of Nature?" *Analecta Hermeneutics* 5. 9-10. Web.

25. *Ibid.*

Matt Hare is a philosopher whose work has lately been concerned with the various legacies of 'empiricism', the relationship between experience and abstraction, and the process of formalisation, particularly as it occurs in mathematics.

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Inhumanism, Reason, Blackness, Feminism

Nina Power

Paradoxically, it is perhaps the case that what makes us most human is our capacity for the inhuman, which is to say, reason forces us to confront all the many ways in which we are not such a special animal, and all the ways we can, for example, be carved up into chemicals and atoms and DNA, in the end not so far away from a piece of fruit. This sense of the inhuman has a highly complicated relationship with *inhumanism* understood as the desire for destruction or for the callous disregard for the lives of other human beings, but I will suggest that there is a sense, or several senses, of thinking about inhumanism that both take violence into account and move beyond it.

What we are dealing with in the 'positive' definition of the inhuman (which proceeds carefully, negatively, and with great difficulty) is the recognition that what human reason reaches for is something that may cause the human itself to be displaced. Humanism completes and incompletes itself because its inhuman drive perennially reopens itself to the universe and produces knowledge that potentially undercuts what it means to be human at any given historical moment. The sun and all the other planets do not revolve around the Earth. As Reza Negarestani puts it: "[i]nhumanism is the extended practical elaboration of humanism; it is born out of a diligent commitment to the project of enlightened humanism."[1] We are pushed to answer questions we cannot answer, as Immanuel Kant famously noted, and the answers we receive are frequently destructive to the image we have of ourselves: it turns out that we are not the center of the universe, we

are not special, we know an extraordinarily limited amount of things, we barely understand our own motivations for doing anything, and though we hope we might live forever, we are incapable of living for any more than a brief moment of time.

Jean Luc Moulène, Bouboulina, Paris, 2016, Coated and painted hard foam, magnets, 53x102x60 cm, Courtesy Miguel Abreu Gallery

And yet, we are capable of realizing *this* at least. In a sense, all collective human knowledge proceeds by negation and obstacle. What we think might cause us devastation and difficulty, and yet it is knowledge that links us to the entire history of humanity, to everyone that lives today, and to all those who might come after. The question of *who lives such that they might think* is, in fact, at the heart of the definition of inhumanism under discussion here. We do not have to individually know something to understand that collective humanity, and the current living portion of which we might optimistically and idealistically bracket under the banner of 'internationalism,' is an immense bearer of reason. Historically, and not only historically, however, vast swathes of humanity have,

for reasons of prejudice, acquisition, and other violent motives, been excluded from this image of the bearer of reason. Frantz Fanon's sardonic reflection on humanism and reason in *Black Skin, White Masks* makes this clear:

After much reluctance, the scientists had conceded that the Negro was a human being; *in vivo* and *in vitro* the Negro had been proved analogous to the white man: the same morphology, the same histology. Reason was confident of victory on every level. I put all the parts back together. But I had to change my tune. That victory played cat and mouse; it made a fool of me. As the other put it, when I was present, it was not; when it was there, I was no longer. In the abstract there was agreement: The Negro is a human being. That is to say, amended the less firmly convinced, that like us he has his heart on the left side. But on certain points the white man remained intractable.[2]

On March 29, 1968 in Memphis, Civil Rights marchers wearing placards reading "I am a man" face off U.S. National Guard troops armed with bayonet, Bettmann, Getty images.

Fanon's description in the same text of the "zone of nonbeing" offers serious challenge to the universalism that we might too quickly reach for in a bid to unify our image of collective humanity:

> *At the risk of arousing the resentment of my colored brothers, I will say that the black is not a man. There is a zone of nonbeing, an extraordinarily sterile and arid region, an utterly naked declivity where an authentic upheaval can be born. In most cases, the black man lacks the advantage of being able to accomplish this descent into a real hell.*[3]

More recently, Frank B. Wilderson III has pushed Fanon's experience and description of the exclusion of blackness from humanity and mankind further away from the existentialism that dialectically threatens to reincorporate Fanon back into a comfortable, albeit highly critical, narrative. In "Afro-Pessimism and the End of Redemption" Wilderson writes:

> *It is my conviction that Black people* embody (*which is different from saying are always willing or allowed to express) a meta-aporia for Humanist thought and action … A Black radical agenda is terrifying to most people on the Left because it emanates from a condition of suffering for which there is no imaginable strategy for redress—no narrative of redemption.*[4]

For Wilderson, the social death of black life entails no redemptive narrative, beloved of the humanities. Because Blackness cannot be "disimbricated from slavery," there is no temporality that makes narrative as development and redemption open to it, but only a "flat line" of time. Social death and the absence of narrative makes Blackness impossible to house under the aegis of the Humanities:

> *Foundational to the labors of disciplines housed within the Humanities is the belief that all sentient beings can be emplotted as narrative entities, that every sentient subject is imbued with historicity, and this belief is subtended by the idea that all beings can be redeemed. Historicity and redemption are inextricably bound. Both are inherently anti-Black in that without the psychic and/or physical presence of a sentient being that is barred,* ab initio*, from narrative and, by extension, barred from redemption, the arc of redemption would lack any touchstones of cohesion. One would not be able to know what a world devoid of redemption looks like.*
> *There* would*, in fact, exist a persona who is adjacent to redemption, that is, a degraded humanity that struggles to be* re-*redeemed (i.e., LGBT people, Native Americans, Palestinians). However, redemption's semiotics of meaning would still be incoherent because adjacency is supplemental to meaning; contradistinction is essential to meaning and coherence—and for this, redemption requires not degraded humanity but abject inhumanity. Abject inhumanity* stabilizes *the redemption of those who do not need it, just as it* mobilizes *the narrative project of those who strive to be re-redeemed.*[5]

Might not the broken, non-narrative of reason that the human paradoxically engenders, have some parallels with the non-narrative that Wilderson identifies? Can the philosophy of science learn something from Afro-pessimism? When Gaston Bachelard writes that "abstraction does not proceed uniformly"[6] and that "we know *against* previous knowledge, when we destroy knowledge that was badly made and surmount all those obstacles … that lie in the mind itself,"[7] we might feel that these points have nothing to do with the "abject inhumanity" that Wilderson's text describes. And yet, just as Wilderson's positing of non-redemptive Blackness completely destroys the happy narratives of the Humanities, at the same time as it posits the role that abject inhumanity plays in stabilizing and mobilizing the redemption and narratives of others, Bachelard's negative image of science and scientific anti-narrative presents another type of inhumanism that allows us to turn away from scientific knowledges own narratives and towards the uneven, inhuman abstractions of reason itself: "Nothing is self-evident. Nothing is given."[8]

Let me try to be clear. There is nothing remotely positively analogous about slavery and science, and the latter is historically complicit in ideas that actively contributed to the material destruction of the lives of black people, just as humanism and the humanities often provided cover-stories for white expropriation under the guise of and inclusive exclusion that reinforced racial hierarchies and inequalities of all kinds. Yet, we can say that there are various conceptions of inhumanism, each operating at different levels, each of which hollows out redemption, and each of which proceeds by negation. Bachelard's depiction of reason and science as proceeding by negation rails against counter-intuition, against 'facts': "Reason alone can dynamise research for it is reason alone that goes beyond ordinary experience (immediate and specious) and suggests scientific experiment (indirect and fruitful)."[9] Against the pile-up of 'facts,' Bachelard proposes something completely contrary: "Historians of science have to take ideas as facts. Epistemologists have to take facts as ideas and place them within a system of thought. A fact that a whole era has misunderstood remains a *fact* in historians' eyes. For epistemologists however, it is an *obstacle*, a counter-thought."[10] The racism and sexism of historical manifestations and practices of science can be recognized as obstacles to forms of inhumanism that are not themselves inhuman in practice, and indeed, actively work against the inhumanity of historical 'facts.' As the Xenofeminist Manifesto puts it with regard to patriarchy and rationality:

> *To claim that reason or rationality is 'by nature' a patriarchal enterprise is to concede defeat. It is true that the canonical 'history of thought' is dominated by men, and it is male hands we see throttling existing institutions of science and technology. But this is precisely why feminism must be a rationalism—because of this miserable imbalance, and not despite it. There is no 'feminine' rationality, nor is there a 'masculine' one. Science is not an expression but a suspension of gender. If today it is dominated by masculine egos, then it is at odds with itself—and this contradiction can be leveraged.*[11]

Other recent work has even more practically called for a kind of feminist universalism, that is at the same time an internationalism, and a Marxism:

> *The internationalism we propose will ultimately be in need of a reinvented feminist universalism that will hopefully be grounded in new forms of realism and (Marxist) materialism for feminist theory and political practice.*[12]

But if gender is recognized, not as eternal essence, but as oppressive historical imposition, can we also say that science "is not an expression but a suspension of race," given that there is no scientific basis for racial division, only pseudo-sciences that purport to justify violence and division? Again, we must be wary of mappings, of too-neat overlaps. What we can defend, minimally, is the fact that there is a theoretical inhumanism, or forms of theoretical inhumanism, that mitigate *against* practical inhumanism. Reason is not the friend of the racist or the sexist, though it has frequently been illegitimately invoked by them. Wilderson argues that even the typical separation/putting-together of gender and race may lead us to misunderstand the fundamental non-redeemability of Blackness, very particularly. As Wilderson states:

> *[W]e come to think of our oppression as being* essentially *gendered, as opposed to being gendered in important ways. This, I believe, gives us a false sense of agency, a sense that we can redress the violence of social death in ways which are analogous to the tactics of our so-called allies of color … By parceling rape out to women, castration to men, our political language offers Black Humanist scholars, Black radical insurgents, as well as the Black masses a sense that our political agency is something more than mere "borrowed institutionality."*[13]

None of this is simple. Those groups of people who have been inclusively excluded (slaves and women from the *polis*), and continue to be excluded not just from social, cultural, scientific and political life, *but from life itself*, are not treated inhumanly, or regarded as non-human, in the same way. Banishment to the realm of non-being, or to the position of 'second', or even 'second' and 'last' at once, are positions of great

specificity whose only commonality is the oppressive structures that entail these dominant forms of oppression, and even then, one is often a fractured and split subject, pinned by the multiple identifications of the other. If there are resources in the documentation and identification of irrational and violent inhumanisms for the sake of a rational inhumanism of the future that is *at the same time* the complete and total *recognition* and *negation* of racism and sexism, it can only be simultaneously minimal (proceeding by negation and with the recognition of thought itself and 'facts' as obstacles) and completely expansive (capable of not only recognizing the historical harm done by 'reason,' 'humanism,' 'man,' etc., but of making reason truly free, or reason making *itself* free, for everyone, such that everyone is a scientist—we will of course need to transform what that word means too). As Negarestani puts it:

> *The force of inhumanism operates as a retroactive deterrence against antihumanism by understanding humanity historically—in the broadest physico-biological and socioeconomical sense of history—as an indispensable runway toward itself.*[14]

Leonid Rogozov operating himself, Novolazarevskaïa Station, Antartica, April 1961.

Inhumanism as a starting point is the simultaneous recognition of the lack of humanism (and humanity) as imposition, and of inhumanism as absolute, collective, shared human capacity for reason. Inhumanism may tell us things that we do not like to hear, but it does so to us *collectively*. Via obstacle, negation and the overcoming of ideology, it creates an empty image of collective thought that is nevertheless crystalline in its brilliance. The insights into inhumanism afforded by those practically excluded from the life of the mind and from politics are today the best positioned to reinvent reason, universalism and the positive inhumanism at the heart of humanism itself.

Footnotes

1. Reza Negarestani. "The Labour of the Inhuman, Part One: Human.' e-flux 52, February 2014. Available here: http://www.e-flux.com/journal/52/59920/the-labor-of-the-inhuman-part-i-human/

2. Frantz Fanon. *Black Skin, White Masks* (orig. French, 1952). Trans. Charles Lam Markmann. London: Pluto Press, 1986. 90-91. Print.

3. *Ibid.* 1-2.

4. Frank B. Wilderson III. "Afro-Pessimism and the End of Redemption." *Humanities Futures*. Franklin Humanities Institute: Duke University, 2015. Web.

5. *Ibid.*

6. Gaston Bachleard. *The Formation of the Scientific Mind: A Contribution to a Psychoanalysis of Objective Knowledge* (orig. French, 1938). Trans. Mary McAllester Jones. Manchester: Clinamen Press, 2002. 18. Print.

7. *Ibid*. 24.

8. *Ibid*. 25.

9. *Ibid. 27.*

10. *Idem.*

11. Laboria Cuboniks. "Xenofeminism: A Politics for Alienation." www.laboriacuboniks.net/20150612-xf_layout_web.pdf

12. Katerina Kolozova. "Preface." *After the "Speculative Turn": Realism, Philosophy, and Feminism*. Eds. Katerina Kolozova & Eileen A. Joy. Earth, Milky Way: punctum books, 2016. 15. Print.

13. Wilderson. *Op. cit.*

14. Negarestani. *Op. cit.*

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Machines that Morph Logic: Neural Networks and the Distorted Automation of Intelligence as Statistical Inference

Matteo Pasquinelli

> *Perceptrons [artificial neural networks] are not intended to serve as detailed copies of any actual nervous system. They are simplified networks, designed to permit the study of lawful relationships between the organization of a nerve net, the organization of its environment, and the "psychological" performances of which the network is capable. Perceptrons might actually correspond to parts of more extended networks in biological systems... More likely, they represent extreme simplifications of the central nervous system, in which some properties are exaggerated, others suppressed.*
> *—Frank Rosenblatt*[1]

> *No algorithm exists for the metaphor, nor can a metaphor be produced by means of a computer's precise instructions, no matter what the volume of organized information to be fed in.*
> *—Umberto Eco*[2]

The term Artificial Intelligence is often cited in popular press as well as in art and philosophy circles as an alchemic talisman whose functioning is rarely explained. The hegemonic paradigm to date (also crucial to the automation of labor) is not based on GOFAI (Good Old-Fashioned Artificial Intelligence that never succeeded at automating *symbolic deduction*), but on the neural networks designed by Frank Rosenblatt back in 1958 to automate *statistical induction*. The text highlights the role of logic gates in the

distributed architecture of neural networks, in which a generalized control loop affects each node of computation to perform pattern recognition. In this distributed and adaptive architecture of logic gates, rather than applying logic to information top-down, *information turns into logic*, that is, a representation of the world becomes a new function in the same world description. This basic formulation is suggested as a more accurate definition of *learning* to challenge the idealistic definition of (artificial) intelligence. If pattern recognition via statistical induction is the most accurate descriptor of what is popularly termed Artificial Intelligence, the distorting effects of statistical induction on collective perception, intelligence and governance (over-fitting, apophenia, algorithmic bias, "deep dreaming," etc.) are yet to be fully understood.

More in general, this text advances the hypothesis that new machines enrich and destabilize the mathematical and logical categories that helped to design them. Any machine is always a machine of cognition, a product of the human intellect and unruly component of the gears of extended cognition. Thanks to machines, the human intellect crosses new landscapes of logic in a materialistic way—that is, under the influence of historical artifacts rather than Idealism. As, for instance, the thermal engine prompted the science of thermodynamics (rather than the other way around), computing machines can be expected to cast a new light on the philosophy of the mind and logic itself. When Alan Turing came up with the idea of a universal computing machine, he aimed at the simplest machination to calculate all possible functions. The efficiency of the universal computer catalyzed in Turing the alchemic project for the automation of human intelligence. However, it would be a sweet paradox to see the Turing machine that was born as *Gedankenexperiment* to demonstrate the incompleteness of mathematics aspiring to describe an exhaustive paradigm of intelligence (as the Turing test is often understood).

A Unit of Information Is a Logic Unit of Decision

Rather than reiterating GOFAI—that is, the top-down application of logic to information retrieved from the world—this text tries to frame the transmutation of *external information into internal logic* in the machination of neural networks. Within neural networks (as according also to the classical cybernetic framework), information becomes control; that is, a numerical input retrieved from the world turns into a control function of the same world. More philosophically, it means that a representation of the world (information) becomes a new rule in the same world (function), yet under a good degree

of statistical approximation. *Information becoming logic* is a very crude formulation of intelligence, which however aims to stress openness to the world as a continuous process of learning.

The transformation of information into higher functions can probably be detected at different stages in the history of intelligent machines: this text highlights only the early definition of information and feedback loops before analyzing their ramification into neural networks. The metamorphosis of an information loop into higher forms of knowledge of the world was the concern of Second-Order Cybernetics across the 1970s, but it was already exemplified by Rosenblatt's neural networks at the end of the 1950s.[3] In order to understand how neural networks transform information into logic, it might be helpful then to deconstruct the traditional reception of both the concepts of information and information feedback. Usually Claude Shannon is castigated for the reduction of information to a mathematical measure according to channel noise.[4] In the same period, more interestingly, Norbert Wiener defined information as *decision*.

> *What is this in information, and how is it measured? One of the simplest, most unitary forms of information is the recording of a choice between two equally probable simple alternatives, one or the other of which is bound to happen—a choice, for example, between heads and tails in the tossing of a coin. We shall call a single choice of this sort a* decision.[5]

If each unit of information is a unit of decision, an atomic doctrine of control is found within information. If information is decision, any bit of information is a little piece of control logic. Bateson will famously add that "information is a difference that makes a difference," preparing cybernetics for higher orders of organization.[6] In fact, Second-Order Cybernetics came to break the spell of the negative feedback loop and the obsession of early cybernetics with keeping biological, technical and social systems constantly in equilibrium. A negative feedback loop is defined as an information loop that is gradually adjusted to adapt a system to its environment (regulating its temperature, energy consumption, etc.). A positive feedback loop, on the contrary, is a loop that grows out of control and brings a system far from equilibrium. Second-Order Cybernetics remarked that only far-from-equilibrium systems make possible the generation of new structures, habits and ideas (it was Nobel Prize Ilya Prigogine who showed that forms of self-organization nevertheless occur also in turbulent and chaotic states).[7] If already in the basic formulation of early cybernetics, the feedback loop could

be understood as a model of information that turns into logic, that morphs logic itself to invent new rules and habits, only Second-Order Cybernetics seems to suggest that it is the excessive 'pressure' of the external world that forces machinic logic to mutate.

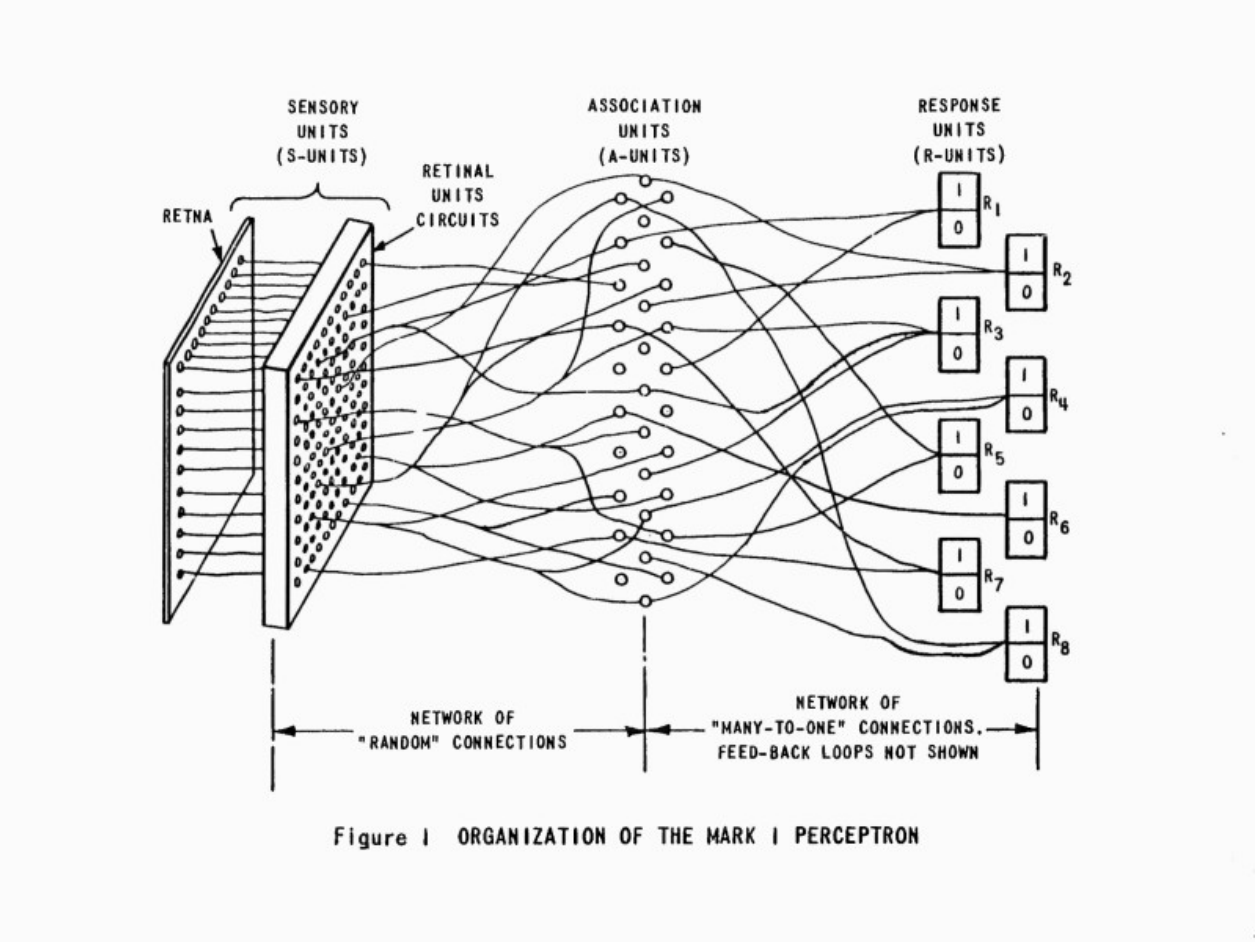


Diagram of the organisation of the Mark 1 Perceptron. Source with feedback loop not shown. Source: Frank Rosenblatt, Mark I Perceptron Operators' Manual. Buffalo, NY: Cornell Aeronautical Laboratory, 1960.

Frank Rosenblatt and the Invention of the Perceptron

Whereas the evolution of artificial intelligence is made of multiple lineages, this text recalls only the crucial confrontation between two classmates of The Bronx High School of Science, namely Marvin Minsky, founder of the MIT Artificial Intelligence Lab, and Frank Rosenblatt, the inventor of the first operative neural network, the Perceptron. The clash between Minsky and Rosenblatt is often simplified as the dispute between a top-down rule-based paradigm (symbolic AI) and distributed parallel computation (connectionism). Rather than incarnating a fully intelligent algorithm from start, in the

latter model a machine *learns* from the environment and gradually becomes partially 'intelligent.' In logic terms, here runs the tension between *symbolic deduction* and *statistical induction*.[8]

In 1951, Minsky developed the first artificial neural network SNARC (a maze solver), but then he abandoned the project convinced that neural networks would require excessive computing power.[9] In 1957, Rosenblatt described the first successful neural network in a report for Cornell Aeronautical Laboratory titled "The Perceptron: A Perceiving and Recognizing Automaton." Similar to Minsky, Rosenblatt sketched his neural network, giving a bottom-up and distributed structure to the artificial neuron idea of Warren McCulloch and Walter Pitts that was itself inspired by the eye's neurons.[10] The first neural machine, the Mark 1 Perceptron, was born in fact as a vision machine.[11]

> *A primary requirement of such a system is that it must be able to recognize complex patterns of information which are phenomenally similar [...] a process which corresponds to the psychological phenomena of "association" and "stimulus generalization." The system must recognize the "same" object in different orientations, sizes, colors, or transformations, and against a variety of different backgrounds. [It] should be feasible to construct an electronic or electromechanical system which will learn to recognize similarities or identities between patterns of optical, electrical, or tonal information, in a manner which may be closely analogous to the perceptual processes of a biological brain. The proposed system depends on probabilistic rather than deterministic principles for its operation, and gains its reliability from the properties of statistical measurements obtained from large populations of elements.*[12]

It must be clarified that the Perceptron was not a machine to recognize simple shapes like letters (optical character recognition already existed at the time), but a machine that could *learn* how to recognize shapes by calculating one single statistical file rather than saving multiple ones in its memory. Speculating beyond image recognition, Rosenblatt prophetically added: "Devices of this sort are expected ultimately to be capable of concept formation, language translation, collation of military intelligence, and the solution of problems through inductive Logic."[13]

In 1961, Rosenblatt published *Principles of Neurodynamics: Perceptrons and the Theory of Brain Mechanism*, which would influence neural computation until today (the term Multi-Layer Perceptron, for example, is already here). The book moves from psychological and neurological findings on neuroplasticity and applies them to the design of neural networks. The Perceptron was an artifactual model of the brain that was intended to explain some of its mechanisms without being taken for the brain itself. (In

fact, neural networks were conceived by imitating the eye's rather than the brain's neurons, and without knowing how the visual cortex actually elaborates visual inputs). Rosenblatt stressed that artificial neural networks are both a simplification and exaggeration of nervous systems and this approximation (that is the recognition of limits in model-based thinking) should be a guideline for any philosophy of the (artefactual) mind. Ultimately Rosenblatt proposed *neurodynamics* as a discipline against the hype of artificial intelligence.

> *The perceptron program is* not *primarily concerned with the invention of devices for "artificial intelligence", but rather with investigating the physical structures and neurodynamic principles which underlie "natural intelligence." A perceptron is first and foremost a brain model, not an invention for pattern recognition. As a brain model, its utility is in enabling us to determine the physical conditions for the emergence of various psychological properties. It is by no means a "complete" model, and we are fully aware of the simplifications which have been made from biological systems; but it is, at least, as analyzable model.*[14]

In 1969 Marvin Minsky and Seymour Papert's book, titled *Perceptrons*, attacked Rosenblatt's neural network model by wrongly claiming that a Perceptron (although a simple single-layer one) could not learn the XOR function and solve classifications in higher dimensions. This recalcitrant book had a devastating impact, also because of Rosenblatt's premature death in 1971, and blocked funds to neural network research for decades. What is termed as the first 'winter of Artificial Intelligence' would be better described as the 'winter of neural networks,' which lasted until 1986 when the two volumes *Parallel Distributed Processing* clarified that (multilayer) Perceptrons can actually learn complex logic functions.[15] Half a century and many more neurons later, pace Minsky, Papert and the fundamentalists of symbolic AI, multilayer Perceptrons are capable of better-than-human image recognition, and they constitute the core of Deep Learning systems such as automatic translation and self-driving cars.[16]

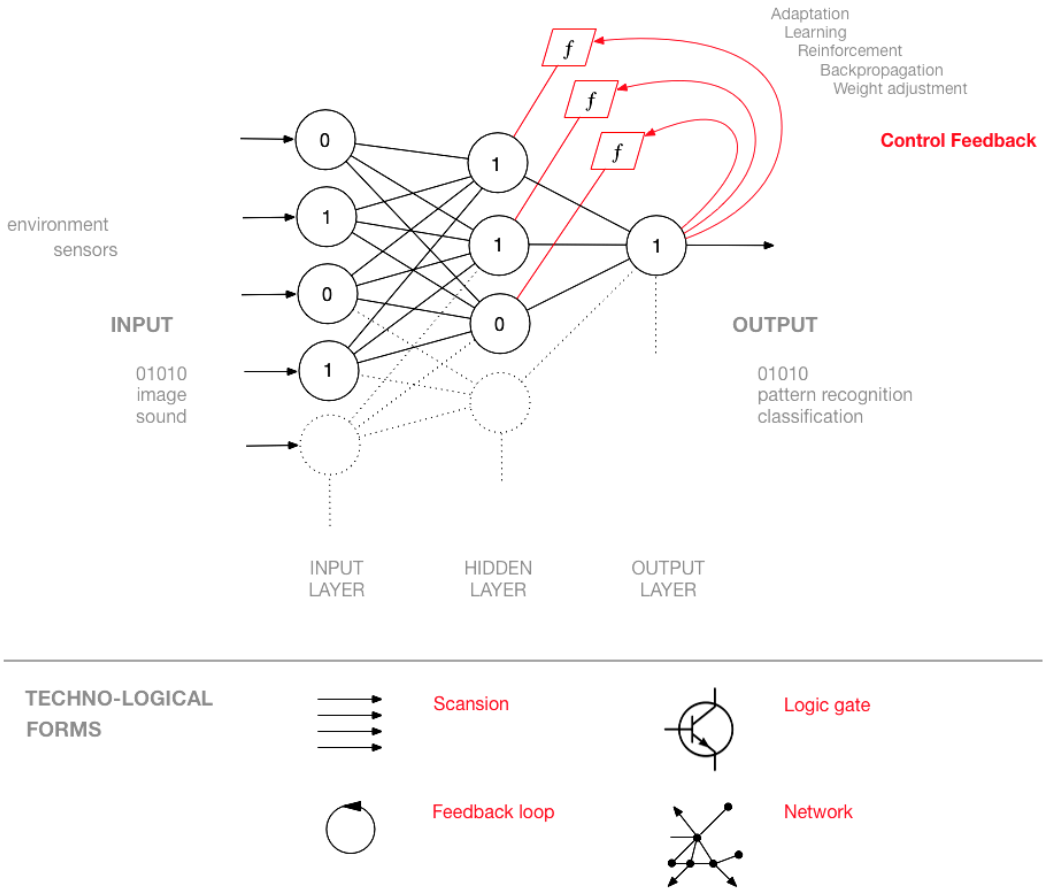


Diagram of a simple neural network showing feedback loops. Matteo Pasquinelli, HfG Karlsruhe. See: www.academia.edu/33205589

Anatomy of a Neural Network

In terms of media archaeology, the neural network invention can be described as the composition of four techno-logical forms: scansion (discretization or digitization of analog inputs), logic gate (that can be realized as potentiometer, valve, transistor, etc.), feedback loop (the basic idea of cybernetics), and network (inspired here by the arrangement of neurons and synapses). Nonetheless, the purpose of a neural network is to calculate a statistico-topological construct that is more complex than the disposition of such forms. The function of a neural network is to record similar input patterns (training dataset) as an *inner state* of its nodes. Once an inner state has been calculated (i.e., the neural network has been 'trained' for the recognition of a specific pattern), this statistical construct can be installed in neural networks with identical structure and used to recognize patterns in new data.

The logic gates that are usually part of linear structures of computation acquire, in the parallel computing of neural networks, new properties. In this sense, Rosenblatt gave probably one of the first descriptions of machine intelligence as emergent property: "It is significant that the individual elements, or cells, of a nerve network have never been demonstrated to possess any specifically psychological functions, such as 'memory,' 'awareness,' or 'intelligence.' Such properties, therefore, presumably reside in the organization and functioning of the network as a whole, rather than in its elementary parts."[17] Yet neural networks are not horizontal but hierarchical (layered) networks. The neural network is composed of three types of neuron layers: input layer, hidden layers (that can be many, from which the term 'deep learning'), and output layer. Since the first Perceptron (and revealing the influence of the visual paradigm) the input layer is often called retina, even if it does not compute visual data. The neurons of the first layer are connected to the neurons of the next one, following a flow of information in which a complex input is encoded to match a given output. The structure that emerges is not really a network (or a rhizome) but an *arborescent network*, that grows as a *hierarchical cone* in which information is pipelined and distilled into higher forms of abstraction.[18] Each neuron of the network is a transmission node, but also a computational node; it is information gate and logic gate. Each node has then two roles: to transmit information and to apply logic. The neural network 'learns' as the wrong output is redirected to adjust the error of each node of computation until the desired output is reached. Neural networks are much more complex than traditional cybernetic systems, since they instantiate a *generalized feedback loop* that affects a multitude of nodes of computation. In this sense, the neural network is the most adaptive architecture of computation designed for machine learning.

The generalized feedback affects the *function* of each node or neuron; that is, the way a node computes (its 'weight'). The feedback that controls the computation of each node (what is variously termed weight adjustment, error backpropagation, etc.) can be an equation, an algorithm, or even a human operator. In one specific instance of neural network, by modifying a node threshold, the control feedback can change an OR gate into an AND gate, for example—which means that the control feedback changes the way a node 'thinks.'[19] The logic gates of neural networks compute information in order to affect the way they will compute future information. In this way, *information affects logic*. The business core of the main IT companies today is about finding the most effective formula of the neural control feedback.

More specifically, the neural network learns how to recognize a picture by recording the dependencies or relations between pixels and statistically composing an internal representation. In a photo of an apple, for instance, a red pixel may be surrounded by other red pixels 80% of the time, and so on. In this way also, unusual relations can be combined in more complex graphical features (edges, lines, curves, etc.). Just as an apple has to be recognized from different angles, an actual picture is never memorized, only its statistical dependencies. The statistical graph of dependencies is recorded as a multidimensional internal representation that is then associated to a human-readable output (the word 'apple'). This model of training is called supervised learning, as a human decides if each output is correct. Unsupervised learning is when the neural network has to discover the most common patterns of dependencies in a training dataset without following a previous classification (given a dataset of cat pictures, it will extract the features of a generic cat).

Dependencies and patterns can be traced across the most diverse types of data: visual datasets are the most intuitive to understand but the same procedures are applied, for instance, to social, medical, and economic data. Current techniques of Artificial Intelligence are clearly a sophisticated form of pattern recognition rather than intelligence, if intelligence is understood as the *discovery and invention of new rules*. To be precise in terms of logic, what neural networks calculate is a form of *statistical induction*. Of course, such an extraordinary form of automated inference can be a precious ally for human creativity and science (and it is the closest approximation to what is known as Peirce's weak abduction), but it does not represent per se the automation of intelligence qua invention, precisely as it remains within 'too human' categories.[20]

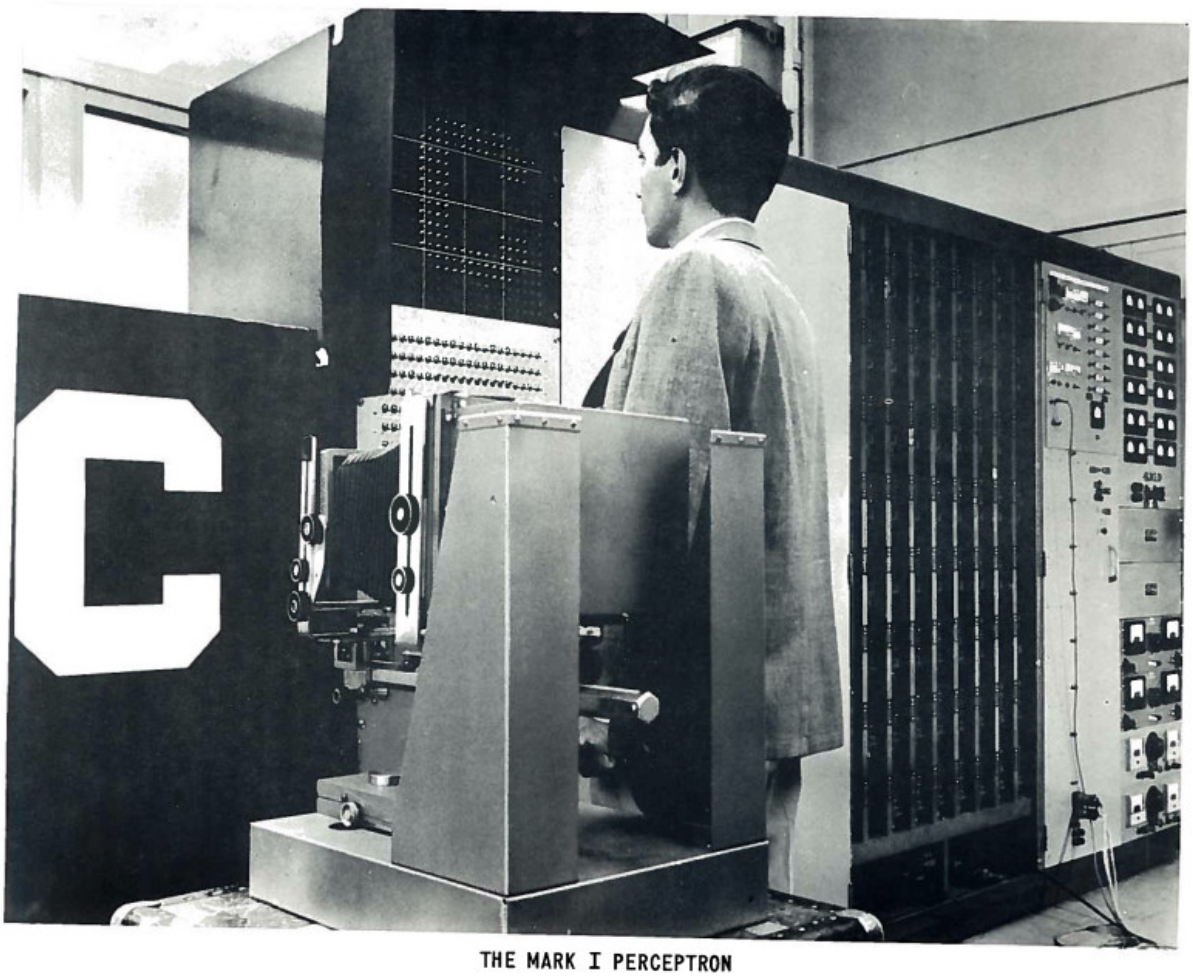
Human, Too Human Computation

Peirce said that "man is an external sign."[21] If this intuition encouraged philosophers to stress that the human mind is an artifactual project that extends into technology, however, the human mind's actual imbrication with the external machines of cognition happened to be rarely *empirically* illustrated. This has produced simplistic poses in which ideas such as Artificial General Intelligence and Superintelligence are evoked as alchemic talismans of posthumanism with little explanation of the inner workings and postulates of computation. A fascinating aspect of neural computation is actually the way it amplifies the categories of human knowledge rather than supersedes them in autonomous forms. Contrary to the naïve conception of the autonomy of artificial intelligence, in the architecture of neural networks many elements are still deeply

affected by human intervention. If one wants to understand how much neural computation extends into the 'inhuman,' one should discern how much it is still 'too human.' The role of the human (and also the locus of power) is clearly visible in (1) the design of the training dataset and its categories, (2) the error correction technique and (3) the classification of the desired output. For reasons of space, only the first point is discussed here.

The design of the training dataset is the most critical and vulnerable component of the architecture of neural networks. The neural network is trained to recognize patterns in past data with the hope of extending this capability on future data. But, as has already occurred many times, if training data show a racial, gender and class bias, neural networks will reflect, amplify and distort such a bias. Facial recognition systems that were trained on databases of white people's faces failed miserably at recognizing black people as humans. This is a problem called 'over-fitting': given abundant computing power, a neural network will show the tendency to learn too much, that is to fixate on a super-specific pattern: it is therefore necessary to drop out some of its results to make its recognition impetus more relaxed. Similar to over-fitting can be considered the case of 'apophenia,' such as Google DeepDream psychedelic landscapes, in which neural neural networks 'see' patterns that are not there or, better, generate patterns against a noisy background. Over-fitting and apophenia are an example of intrinsic limits in neural computation: they show how neural networks can paranoically spiral around embedded patterns rather than helping to reveal new correlations.

The issue of over-fitting points to a more fundamental issue in the constitution of the training dataset: the boundary of the categories within which the neural network operates. The way a training dataset represents a sample of the world marks, at the same time, a closed universe. What is the relation of such a closed data universe with the outside? A neural network is considered 'trained' when it is able to generalize its results to unknown data with a very low margin of error, yet such a generalization is possible due to the homogeneity between training and test dataset. A neural network is never asked to perform across categories that do not belong to its 'education.' The question is then: How much is a neural network (and AI in general) capable of escaping the categorical ontology in which it operates?[22]



Mark 1 Perceptron. Source: Rosenblatt, Frank (1961) Principles of Neurodynamics: Perceptrons and the Theory of Brain Mechanisms. Buffalo, NY: Cornell Aeronautical Laboratory.

Abduction of the Unknown

Usually a neural network calculates statistical induction out of a homogenous dataset; that is, it extrapolates patterns that are consistent with the dataset nature (a visual pattern out of visual data, for example), but if the dataset is not homogenous and contains multidimensional features (for a very basic example, social data describing age, gender, income, education, health conditions of the population, etc.), neural networks can discover patterns among data that human cognition does not tend to correlate. Even if neural networks show correlations unforeseen to the human mind, they operate within the implicit grid of (human) postulates and categories that are in the training dataset and, in this sense, they cannot make the necessary leap for the invention of radically new categories.

Charles S. Peirce's distinction between deduction, induction and abduction (hypothesis) is the best way to frame the limits and potentialities of machine intelligence. Peirce remarkably noticed that the classic logical forms of inference—deduction and induction—never invent new ideas but just repeat quantitative facts. Only abduction (hypothesis) is capable of breaking into new worldviews and inventing new rules.

> *The only thing that induction accomplishes is to determine the value of a quantity. It sets out with a theory and it measures the degree of concordance of that theory with fact. It never can originate any idea whatever. No more can deduction. All the ideas of science come to it by the way of Abduction. Abduction consists in studying facts and devising a theory to explain them.*[23]

Specifically, Peirce's distinction between abduction and induction can illuminate the logic form of neural networks, as since their invention by Rosemblaat they were designed to automate complex forms of induction.

> *By induction, we conclude that facts, similar to observed facts, are true in cases not examined. By hypothesis, we conclude the existence of a fact quite different from anything observed, from which, according to known laws, something observed would necessary result. The former, is reasoning from particulars to the general law; the latter, from effect to cause. The former classifies, the latter explains.*[24]

The distinction between induction as classifier and abduction as explainer frames very well also the nature of the results of neural networks (and the core problem of Artificial Intelligence). The complex statistical induction that is performed by neural networks gets close to a form of weak abduction, where new categories and ideas loom on the horizon, but it appears invention and creativity are far from being fully automated. The invention of new rules (an acceptable definition of intelligence) is not just a matter of generalization of a specific rule (as in the case of induction and weak abduction) but of breaking through semiotic planes that were not connected or conceivable beforehand, as in scientific discoveries or the creation of metaphors (strong abduction).

In his critique of artificial intelligence, Umberto Eco remarked: "No algorithm exists for the metaphor, nor can a metaphor be produced by means of a computer's precise instructions, no matter what the volume of organized information to be fed in."[25] Eco stressed that algorithms are not able to escape the straitjacket of the categories that are implicitly or explicitly embodied by the "organized information" of the dataset. Inventing a new metaphor is about making a leap and connecting categories that never happened to be logically related. Breaking a linguistic rule is the invention of a new rule, only when

it encompasses the creation of a more complex order in which the old rule appears as a simplified and primitive case. Neural networks can *a posteriori* compute metaphors[26] but cannot *a priori* automate the invention of new metaphors (without falling into comic results such as random text generation). The automation of (strong) abduction remains the philosopher's stone of Artificial Intelligence.

(Quasi) Explainable Artificial Intelligence

The current debate on Artificial Intelligence is basically still elaborating the epistemic traumas provoked by the rise of neural computation. It is claimed that machine intelligence opens up new perspectives of knowledge that have to be recognized as posthuman patrimony (see Lyotard's notion of the inhuman), but there is little attention to the symbolic forms of pattern recognition, statistical inference, and weak abduction that constitute such a posthuman shift. Besides, it is claimed that such new scales of computation constitute a black box that is beyond human (and political) control, without realizing that the architecture of such black box can be reverse-engineered. The following passages remark that the human can still break into the 'inhuman' abyss of deep computation and that human influence is still recognizable in a good part of the 'inhuman' results of computation.

It is true that layers and layers of artificial neurons intricate so much computation that it is hard to *look back* into such structure and find out where and how a specific 'decision' was computed. Artificial neural networks are regarded as *black boxes* because they have little to no ability to explain causation, or which features are important in generating an inference like classification. The programmer has often no control over which features are extracted, as they are deduced by the neural network on its own.[27]

The problem is once again clearly perceived by the military. DARPA (the research agency of the US Defense) is studying a solution to the black box effect under the program Explainable Artificial Intelligence (XAI).[28] The scenario to address is, for example, a self-driving tank that turns into an unusual direction, or the unexpected detection of enemy weapons out of a neutral landscape. The idea of XAI is that neural networks have to provide not just an unambiguous output but also a rationale (part of the computational context for that output). If, for example, the figure of an enemy is recognized ("this image is a soldier with a gun"), the system will say why it thinks so—that is, according to which features. Similar systems can be applied also to email monitoring to spot potential terrorists, traitors, and double agents. The system will try not just to detect anomalies of behavior against a normal social pattern, but also to give

explanations of which context of elements describe a person as suspect. As the automation of anomaly detection has already bred its casualties (see the Skynet affair in Pakistan),[29] it is clear that XAI is supposed to preempt also further algorithmic disasters in the context of predictive policing.

Explainable Artificial Intelligence (to be termed more correctly, Explainable Deep Learning) adds a further control loop on top of the architecture of neural networks, and it is preparing a new generation of epistemic mediators. This is already part of a multi-billion business interest as insurance companies, for instance, will cover only those self-driving cars that will provide "computational black box" featuring not just video and audio recordings but also the rationale for their driving decisions (imagine the case of the first accident between two self-driving vehicles). Inhuman scales of computation and the new dark age aesthetics have already found their legal representatives.

Conclusion

In order to understand the historical impact of Artificial Intelligence, this text stresses that its hegemonic and dominant paradigm to date is not symbolic (GOFAI) but connectionist, namely the neural networks that constitute also Deep Learning systems. What mainstream media call Artificial Intelligence is a folkloristic way to refer to neural networks for pattern recognition (a specific task within the broader definition of intelligence and, for sure, not an exhaustive one). Patter recognition is possible thanks to the calculus of the inner state of a neural network that embodies the logical form of statistical induction. The 'intelligence' of neural networks is, therefore, just a statistical inference of the correlations of a training dataset. The intrinsic limits of statistical induction are found in between over-fitting and apophenia, whose effects are gradually emerging in collective perception and governance. The extrinsic limits of statistical induction can be illustrated thanks to Peirce's distinction of induction, deduction, and abduction (hypothesis). It is suggested that statistical induction gets closer to forms of weak abduction (e.g., medical diagnosis), but it is unable to automate strong abduction, as it happens in the discovery of scientific laws or the invention of linguistic metaphors. This is because neural networks cannot escape the boundary of the categories that are implicitly embedded in the training dataset. Neural networks display a relative degree of autonomy in their computation: they are still directed by human factors and they are components in a system of human power. For sure, they do not show signs of

'autonomous intelligence' or consciousness. Super-human scales of knowledge are acquired only in collaboration with the human observer, suggesting that Augmented Intelligence would be a more precise term than Artificial Intelligence.
Statistical inference via neural networks has enabled computational capitalism to imitate and automate both low and hi-skill labor.[30] Nobody expected that even a bus driver could become a source of cognitive labor to be automated by neural networks in self-driving vehicles. Automation of intelligence via statistical inference is the new eye that capital casts on the data ocean of global labor, logistics, and markets with novel effects of *abnormalization*—that is, distortion of collective perception and social representations, as it happens in the algorithmic magnification of class, race and gender bias.[31] Statistical inference is the distorted, new eye of the capital's Master.[32]
The author wishes to thank Anil Bawa-Cavia, Nina Franz, and Nikos Patelis for their comments.

Footnotes

1. Frank Rosenblatt. *Principles of Neurodynamics: Perceptrons and the Theory of Brain Mechanisms*. Buffalo, NY: Cornell Aeronautical Laboratory, 1961. 28. Print.

2. Umberto Eco. *Semiotics and the Philosophy of Language.* Bloomington: Indiana University Press, 1986. 127. Print.

3. See Francis Heylighen and Cliff Joslyn. "Cybernetics and Second-Order Cybernetics" in *Encyclopedia of Physical Science and Technology* 19. Ed. R.A. Meyers. New York: Academic Press, 2001. Print.

4. Claude Shannon. "A Mathematical Theory of Communication." *Bell System Technical Journal* 27/3 (1948). Print.

5. Norbert Wiener. *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge, MA: MIT Press, 1948. 61. Print. Weiner's formulation happened to influence also Jacques Lacan's 1955 lecture on cybernetics and psychoanalysis, in which logic gates are literally understood as "doors" that open onto or close off new destinies within the Symbolic order. Jacques Lacan. "Psychoanalysis and cybernetics, or on the nature of language." *The Seminar of Jacques Lacan* 2. New York: Norton, 1988. Print.

6. Gregory Bateson. *Steps to an Ecology of Mind*. Chicago: University of Chicago Press, 1972. Print.

7. Gregoire Nicolis and Ilya Prigogine. *Self-Organization in Nonequilibrium Systems*. New York: Wiley, 1977. Print.

8. Artificial General Intelligence (AGI) is often the attempt to meet top-down (symbolic) with bottom-up (connectionist) approaches halfway, that is to combine symbolic deduction with statistical induction. To date, however, only the connectionist paradigm of neural networks happened to be successfully automated, casting doubts on some metaphysical and centralizing premises of AGI.

9. See Marvin Minsky. *Theory of Neural-Analog Reinforcement Systems and Its Application to the Brain Model Problem*. Dissertation. Princeton University, 1954. Print.

10. Warren McCulloch and Walter Pitts. "A Logical Calculus of the Ideas Immanent in Nervous Activity." *Bulletin of Mathematical Biophysics* 5/4 (1943). Print. And Warren McCulloch and Walter Pitts. "How We Know Universals the Perception of Auditory and Visual Forms." *Bulletin of Mathematical Biophysics* 9/3 (1947). Print.

11. Remarkably Paul Virilio's book on machine vision was inspired also by the Perceptron (yet Virilio could not foresee that the Perceptron would become the hegemonic paradigm of machine intelligence in the early 21st century). See Ch. 5 in Paul Virilio. *La Machine de vision: essai sur les nouvelles techniques de représentation*. Paris: Galilée, 1988. Print. English translation: *The Vision Machine.* Bloomington: Indiana University Press, 1994. Print.

12. Frank Rosenblatt. "The Perceptron a Perceiving and Recognizing Automaton." *Technical Report* 85/460/1 (1957). 1-2. Print.

13. *Ibid*. 30.

14. Frank Rosenblatt. *Op. cit*. 1961. vii. Print.

15. David Rumelhart and PDP Research Group. *Parallel Distributed Processing: Explorations in the Microstructure of Cognition* 1-2. Cambridge, MA: MIT Press, 1986. Print.

16. Neural networks keep on growing towards even more complex topologies and have inaugurated a true computational ars combinatoria (see the diagrams of auto-encoder, Boltzmann machine, recurrent and Long Short-Term Memory neural network, Adversarial Generative Networks, etc.). Neural networks are the most articulated and sophisticated machines along the tradition of computable knowledge, as in the ancient Arab device *zairja* or Ramon Llull's book *Ars Magna* (1305). See David Link. "Scrambling T-R-U-T-H: Rotating Letters as a Material Form of Thought." *Variantology 4. On Deep Time Relations of Arts, Sciences and Technologies in the Arabic–Islamic World.* Eds. Siegfried Zielinski and Eckhard Fürlus. Cologne: König, 2010. Print.

17. Frank Rosenblatt. *Op. cit.* 1961. 9.

18. See Ethem Alpaydın. *Introduction to Machine Learning*. 2nd ed. Cambridge, MA: MIT Press, 2014. 260. Print.

19. This is one specific case for illustration purposes. Activation functions operate also in different ways.

20. On the attempts to automate weak abduction, see "Automatic Abductive Scientists" in: Lorenzo Magnani. *Abductive Cognition. Springer Science & Business Media,* 2009. 112. Print.

21. Charles S. Peirce. "Some Consequences of Four Incapacities" (1868). *The Essential Peirce* 1 (1867-1893). Eds. Nathan Houser and Christian Kloesel. Bloomington: Indiana University Press, 1992. 54. Print.

22. Ontology is here used in the sense of information science.

23. Charles S. Peirce. *Collected Papers.* Cambridge, MA: Belknap, 1965. 5, 145. Print.

24. Charles S. Peirce. "Deduction, Induction, and Hypothesis" (1878). *Op cit*. 1992. 194.

25. Umberto Eco. *Op. cit.* 127.

26. See Word2vec, a framework for the mapping of word embedding in vectorial space.

27. This is true both in supervised and unsupervised learning. Thanks to Anil Bawa-Cavia for clarifying it.

28. See www.darpa.mil/program/explainable-artificial-intelligence

29. Matteo Pasquinelli. "Arcana Mathematica Imperii: The Evolution of Western Computational Norms." *Former West*. Eds. Maria Hlavajova, et al. Cambridge, MA: MIT Press, 2017. Print.

30. There are different approaches to machine intelligence, yet the hegemony of connectionism in automation is manifest. For an accessible introduction to the different families of machine learning, see Pedro Domingos. *The Master Algorithm*. New York: Basic Books, 2015. Print.

31. Matteo Pasquinelli. "Abnormal Encephalization in the Age of Machine Learning." *e-flux* 75 (September 2016). Web.

32. "The special skill of each individual machine-operator, who has now been deprived of all significance, vanishes as an infinitesimal quantity in the face of the science, the gigantic natural forces, and the mass of the social labor embodied in the system of machinery, which, together with these three forces, constitutes the power of the master". Karl Marx. *Capital 1* (1867). London: Penguin, 1982. 549. Print.

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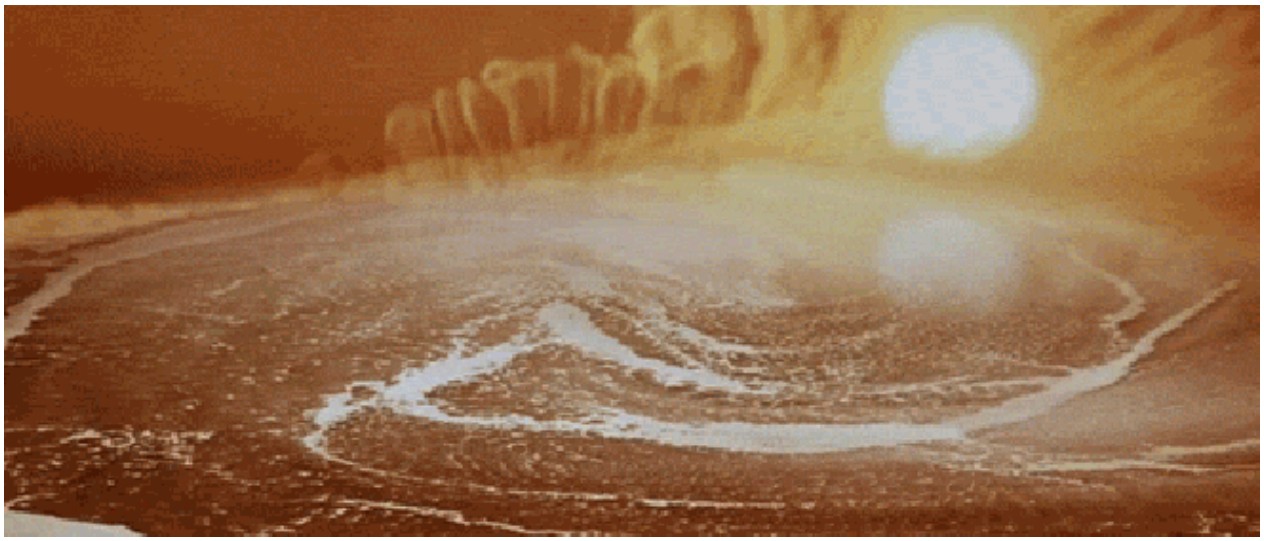
The City Wears Us. Notes on the Scope of Distributed Sensing and Sensation

Benjamin Bratton

Designers are cutting their marks on what will seem like an insane sentient garment, one which lives on and in the surfaces of our future ruins. This clothing combines different kinds of artificial intelligence, embedded industrial sensors, very noisy data, tens of millions of metal and cement machines in motion or at rest, billions of handheld glass-slab computers, billions more sapient hominids, and a tangle of interweaving model abstractions of inputs gleaned from the above. A furtive orchestra of automation is amalgamated from this uneven landscape and capable of unexpected creativity and cruelty: an inside-out cave we may call, after Stanislaw Lem's ocean of *Solaris*, the *plasmic city.* (The "Smart City" is a different prospect. It employs similar tools, but dreams of municipal omniscience and utility optimization. Within this new garment, modern urban programs that have been drawn by the cycles of residence, work, entertainment of earlier eras are re-sorted, but for the Smart City, they are reified and reinforced, misrecognized as controls when they are actually variables.)



An interstellar ocean of subconscious fear-exploiting goo in Solaris by Andreï Tarkovski, 1972

I would like to consider the wearability of this garment as a kind of *skin*. Given that so much urban-scale machine sensing extends or allegorizes *vision*, it may seem odd to focus on the skin, but it is our largest sensory organ. We have extended synthetic vision and synthetic audition, but modern media has done less to augment epidermal sensation (though much more of late).[1] Still, technologies of skin are part of what humans are. Instead of evolving new skins as we migrated, we honed techniques to make special purpose temporary skins, suited for heat, cold, underwater, ritual dramas, camouflage, or to signal roles, etc. The presentation of self and the sexual selection dynamics that ensue, rely heavily on the local semiotics of how we interpret these artificial skins, and so, we have a global fashion and textile merchandising industry. On a more functional level, synthetic skins modulate our environments, tuning them toward the well-tempered.[2] But it is not just us. Urban sensing lets the surfaces of the city sense its environment as well (who, what, where, when, how?). In turn, urban scale Artificial Intelligence depends less on "AI in a Petri dish" than AI in the wild, feeling and reacting to and indexing its world.[3] As a different and more literal connotation of "distributed cognition" takes form in this way, the already contested line between world-sensing and information-processing gets blurrier.

Tracing what is a prosthesis of whom is open to more perspectives than master-control chains of command.[4] As we wear our skins on our bodies and as our buildings, held under an atmospheric skin in waves of foam (as Sloterdijk would have it), that naturalized arrangement is disturbed by how urban sensing seems to approach

proto-sentience. A person is not only a Virtruvian actor at some phenonomenological core who wears the city; he or she is worn as well. We are also the skin of what we wear. The garment being cut and sewn is not only for us to wear; *the city also wears us.*

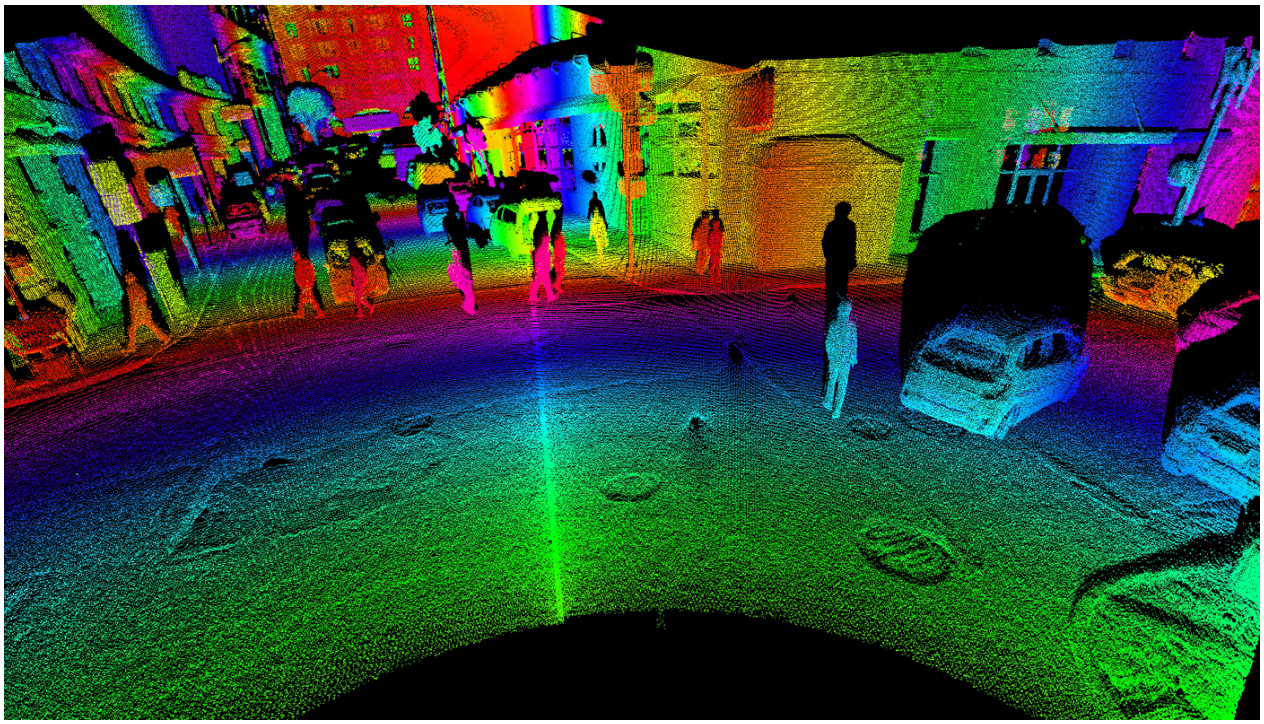
Urban Sensing and Sensibility

I mean to be descriptive, not predictive, so before considering any sensing and sensation to come, we map the sensing we have. What is most easily called artificial intelligence is based not on an accumulation of raw inputs but on patterned impressions drawn from that data, but any functional intelligence is defined by its ability to act upon its world, and its ability to act is construed by what and how it can sense that world and itself within it. There is a particular and perhaps peculiar affect theory for machines to be unwound over the coming years.

For example, driverless cars are emblematic of big heavy machines sensing/learning in the streets. Their proprioceptive sensors include wheel speed sensors, altimeters, gyroscopes, tachymeters, touch sensors, while their exteroceptive sensors include multiple visual light cameras, LiDAR range finding, short- and long-range RADAR, ultrasonic sensors on the wheels, global positioning satellite systems/geolocation aerials, etc. Several systems overlap between sensing and interpretation, such as road sign and feature detection and interpretation algorithms, model maps of upcoming roads, and inter-car interaction behavior algorithms. Along the gradient from fully to partially autonomous, the humans inside provide another intelligent component that may be variously copilot or cargo, and together they form a composite *User* ambling through the *City* layer of The Stack.[5]

But the sensing and thinking systems are located not just in the valuable subjects and objects rolling around, they are built into the fabric of the city in various mosaics. Because how a sentient city thinks is inextricable from how a sentient city senses, a good catalog is less a litany of objects in a flat ontology, or the feature set in a new model technology, than an anatomical index of the interlocking capacities and limitations of an incipient machinic sensate world. The distributed body includes not only automotive sensors, but also digital component sensors, flow sensors, humidity sensors, position sensors, rate and inertial sensors, temperature sensors, relative motion sensors, visible light sensors and recording “cameras,” position sensors, local area and wide area scanners, vibration sensors, force sensors, torque sensors, water and moisture sensors, piezo film sensors, fluid property sensors, ultrasonic sensors, pressure sensors, liquid level sensors, and so on. From a more panoramic vantage, remote sensing systems in low

Earth orbit interlace with terrestrial networks to draw data up and down in turn. Remote geosensing may observe bodies of water, vegetation, human settlements, soils, minerals, and geomorphology with techniques including photogrammetry, multispectral systems, electromagnetic radiation, aerial photography, multispectral systems, thermal infrared sensing, active and passive microwave sensing, and LiDAR at different scales, etc.[6] While many of these have been part of cities, factories and geographies for decades, their integration into the landscape by standardized computational protocols and networks (by conventional Internet of Things models, or otherwise) means that domain specific and more general artificial intelligence has a path out of the laboratory and toward metropolitan-scale evolutionary robotics. How are they to be worn?



Lidar vision from Toyota self-driving car using Luminar technology, 2017.

Wearability

Wearable computing, as a domain of consumer electronics, is embryonic at best. Today the term refers to smart watches and sensors that monitor heartbeat or glucose level in sweat, or blinking lights on clothes triggered by sequencing software. Not very inspiring stuff so far. In time, however, as microelectronics and signal processing layers shrink and become more energy efficient, the expanded sector of “wearables” may become predominate, just as mobile computing took leave of desktop computing. Of more interest to us is how the miniaturization and flattening of system profiles may allow

them to cover many different kinds of skins: animal and vegetal skins, architectural skins, machine skins, etc. Any surface is potentially also a skin and its sensitivity is open to design. The sensor arrays that outfit those drivers' cars, for example, will evolve, combine and specialize further. Descendants of these arrays may cover other machines, in motion or at rest, familiar or unfamiliar. Wearability then is not just for human users, or even only bodies in motion, but for any "user" that has a surface.

Just as what counts as a skin changes once the sensory capacities of a surface are made more animate, what counts as "wearability" changes as diverse skins are augmented by *shared* sensors. That is, the flexibility and ubiquity of these sensors is also a function of the *platformization* of components and sub-components across applications, and the distribution of the same or similar sensors across unlike surfaces means that very different kinds of bodies share the same sensory systems. A version of a sensor stuck onto a mammal skin may be derived genealogically from one on an assembly-line, and if we take seriously the implications of technical evolution, then this blurring and blending of sensors across different dermal surfaces stitches cyborgs together as much as the inter-assembly of organs.

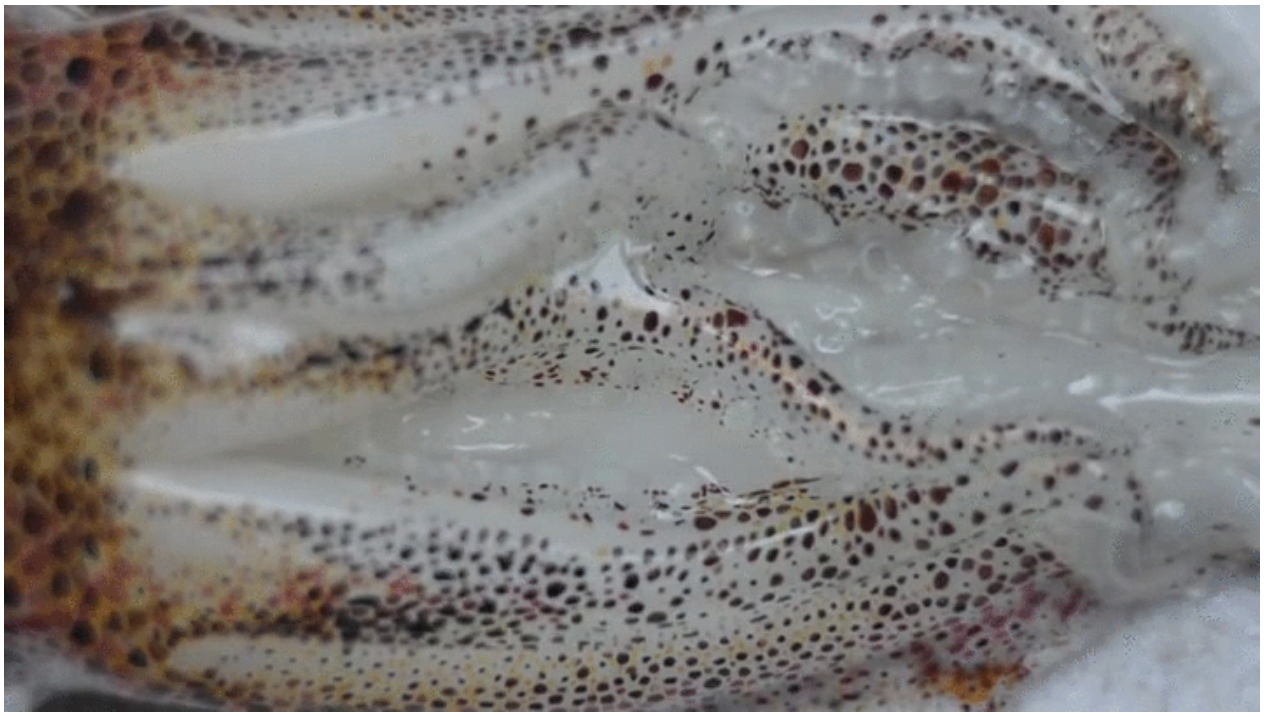
However, today's recommended uses of wearables are trained on banal key performance indicators and the optimization of functions that may have been derived from waning social contexts. The potential of wearable computation considered widely is not this auto-managerialism, but the flowering of unforeseeable biosemiosis between users now capable of sensing and being sensed by one another in strange ways. These may be one-off experiences, which remain isolated and unthought fragments, or they may cohere into more profound processes around which we decide who we are.

In the meantime, our conventional understanding of our own skin will drive and curtail what the expanded scope synthetic skins/wearable computing is asked to do. But sooner rather than later we may encounter phenomena for which we do not have sufficient words (just as we have such an incomplete language for pain, the glossary of touch is mute) and the skin we live in now will be made new again by new terms.

To Be Clothed

Clothing is already a synthetic skin, and its functions are not only thermal regulation or protection against abrasion, but to communicate to other people significant subcultural information about *who* we are, not only what we are. It is not simply that red clothes will mean one thing and blue another, but through its incredibly nuanced semantics, fashion produces temporary phenotypes that signal to one another within the twists and turns of

hypercontextual references: the seasonal formality of the hem, the size of a collar, the drabness of a green, the obtuseness of a brand/band on a t-shirt, and the volumetric ratio of spheres that comprise a necklace that may or may not also connect to a triangular fold that exposes only so much of a shoulder. Social dynamics are not only represented or *performed* by this plastic semiotics, they are directly and immanently calculated by them.[7] We are not by far the only animal to do these sorts of things, and different paths draw in other forms of distributed cognition.[8] While we developed synthetic skins, other animals evolved more complex natural skins capable of incredible feats of signification. Cuttlefish, for example, use chromatophores in their skin to dazzle prey, to hide from predators, and to communicate with other cuttlefish. The same reaction may serve different ends depending on the context of presentation. (While crows do seem to have a practical theory of mind, we do not presume that cuttlefish are able to imagine what their skin my look like to another organism, and so to call their shimmering "performance" is probably inaccurate. If so, what then do they see in and as one another?) Importantly, the intelligence is *in* the skin itself. Cuttlefish's chromatophores and iridophores instantaneously modulate to produce dazzlingly complex patterns that correspond to isomorphic neuronal patterns. As skin and brain are bound up into direct circuits, we may say that the membrane's incredible animations are as much a nervous reaction as a cognitive one. The lesson from cuttlefish for how we should imagine a rich ecology of urban-scale AI is profound. It not the aloof central processing brain of Godard's *Alphaville;* it is something far more distributed and far less Cartesian. The intelligence is in the skin and the urban sensing regime on whose behalf we design, may be something like a topography of post-cuttlefish drawn from a Lucy McRae project.[9] But beyond hyperstitional provocation, what about the nuts and bolts engineering of sensing and sensation? At what scale does it start?



Squid camouflaging patterns (chromatophore). All rights reserved.

Everything is a Chemical

All economics is ecological economics. It should go without saying that design does not float as some virtual layer on top of a given nature. Some design philosophies understood this long ago, and the history of post-Asilomar biotechnology is adorned with conjectural biodesign concepts, narratives and diegetic models, and these inform debates by which the ethical, ecological and political implications of these technologies are considered.[10] Biotechnologies are controversial along regular political fault lines, and yet across these, concerns are sometimes possessed by afterimages of creationism. By that term I do not (necessarily) mean the belief that everything in the world was created by a monotheistic agent. It is rather a more diffuse sense that the order of the world is not only a dynamic adaptive system, but a special *text* in which instantiations of metaphysical essences appear to us. Furthermore, it believes that this order is best served by not contaminating those forms (the theologically inspired taboo on scientific agriculture evangelized by, for example, Vandana Shiva) or denying that fundamental perturbations of the system are really even possible (the theologically inspired denial of anthropogenic climate change evangelized by, for example, Sen. James Inhofe).[11] These are often accompanied by admonitions against humanity's hubris and overreach. I see it quite differently. Instead what is at stake for biodesign has less to do with control (real or imagined) over nature,

and whether that is good or bad, than with demystifying the royal human body back into material churn, and locating the designing subject as *a form of matter that is acting on matter that it inhabits*. In this mode, the limiting foundation of design is *chemical*.

How so, and how to? Consider the Nanome project that we helped develop at D:GP at University of California, San Diego. It is a set of VR-based scientific modeling and design tools, including CalcFlow and NanoOne.[12] In short, you use virtual math to make virtual physics, which you use to make virtual chemistry, which you use to make virtual biology. Applications for biotech, and drug discovery are the first trial applications, but providing easier ways to visualize math as a building block of molecular modeling has more fundamental implications.[13] As with many other complex design softwares, we see the integration of machine learning systems to augment and extend form-finding gestures, and in this case we see the accumulation of design queries and solutions also used as training data for biotech research AIs.[14] That is, the *interface* layer for the human user (a means to map, model and simulate material processes) is the input layer for the AI (a pattern of inquiries, both inductive and deductive, that structure the search space for the machine learning system). In this sense, synthetic biology may be seen as a *genre* of applied artificial intelligence. Together these may support important breakthroughs (some day: industrial scale synthetic photosynthesis and individual genome-tailored drug therapies on demand, etc.) and make the "culinary materialism" of biochemistry more available to popular design/hacker initiatives (hopefully a good thing).[15] In fact, the former may prove only to be possible because of the latter.

We think we know quite a bit about animal intelligence and plant intelligence, but AI at urban scale is for the most part a mineral intelligence. Metals, silica, plastics and information carved into them by electromagnetism form the material basis (but not entirely, as I will consider below). In turn, artificial intelligence is a genre of applied inorganic chemistry. Emphasizing the sensory inputs that locate any AI in its own kind of world, we see that this mineral footing does not withdraw it into some arid vacuum from the wet, hot, thermodynamic flesh of the world, quite the contrary. If as Russian Cosmist Nicolai Fyodorov surmised over a century ago, we are the material folded just so, through which the Earth thinks itself, then such folds are available to different sorts of matter as well, including the mixture of organic and inorganic compounds that comprise urban scale AI sensing/thinking systems.

Solar panels, Neom project, Saudi Arabia, 2017. Excerpt from a promotional video available on discoverneom.com

The Persistence of Models

In trying to pinpoint where artificial intelligence can or cannot be located in this folding, defining practical relationships between sensing and thinking come to the fore. Durable threads from Hume and Kant debates enter back: how (and finally *if*) the sensorium of empirical observation relates to a "transcendental" frame that gives moral coherence and wider deduction from what is sensed into reflective judgment, and ultimately phenomenological interiority. For purposes of AI urbanism, we may invoke this foundational division in modern European philosophy provisionally and perhaps only analogically, but at what point must the inorganic chemistry project of engineered sensation possess something like a "frame"? Or, could it congeal or graduate into possessing one, and if it did, how would that shift how we draw such frames in the first place?

Alongside Reza Negarestani's cartographies of inductive and deductive epistemic modalities, we may qualify different species-genres of artificial intelligence according to their relative reliance on either end of this spectrum: input-rich/ model-poor (inductive) input-poor, model-rich (deductive). Broadly we may say that older Good Old-Fashioned AI based on symbolic logic relied on more deductive means through the formal construction of models of a given problem space based on understandings of local and intermediate scales of cause and effect within that space. In principle, if an AI were to

encounter a real-world version of that problem space it would deduce what to do next by the application of generic logic to the specific instantiation. For many well-known reasons—from insufficient data and processing resources to adaptive limitations of logical symbolization—these methods have fallen out of favor compared to more inductive approaches. For example, deep learning systems based on artificial neural networks build functional responses to input corpora, limning vectors into recognizable outputs. For such systems, functional response to inputs can be achieved without the system producing anything like a recognizable formal "model" of the problem space. However, we cannot only look for such frames in AI systems abstracted from real world implementation. But while the opacity of Deep Learning processes does suggest interesting and alien forms of "thought," as practical apparatuses of urban infrastructure our AI systems are not without explicit or implicit human cognitive bias, positive or negative. Drawing on a different connotation of the term, you do need weights and *bias* in an artificial neural network to find evidence of a particular pattern. But the organization of input data into a useful corpus is itself informed by at least several models, including cultural models, that are necessarily full of apophenic errors and pathologies. By one view of this system, the (cultural) model that would structure input data is *external* to the deep learning system, but for another the *whole* apparatus and operation must be seen as at least interconnected and co-constitutive, but more likely part of a dynamic composite that mixes hominid semiotics with machinic cognition (Turing Test either/or filters do not work here either.) The small and large infrastructures that thread through the plasmic city are always a cyborgian cognitive assemblage; they draw upon models of the world that are encoded into one sequence even as they are subtracted from another. Models are mobile, slippery, usually unaccountable even to themselves. That is, even while the beauty of deep learning is in how their hyperinductive processes yield results that often do not (or cannot) match our own models of how we think that we think, the "external" composition of what is relevant input data for the desired output is already internalized into its operations. As would be expected, and as has been shown, explicit and implicit bias in training data ("What is risk? Whose face is risky?") is not only reflected in outputs but is synthesized and amplified, and often then shielded by veneers of false objectivity.[16]

In the Field

Whether ultimately this garment cloaks urban ruins or a new rationality of wilderness is a matter of composition not prediction. Even as AI urbanism is a reflection, it is also a departure, and it would be a dire mistake to forestall the latter by preoccupation with the former. Or, more precisely, we should not only see ourselves in the reflection. We may describe ubiquitous computing not only by the introduction of information media onto surfaces, but also by how it draws upon and manipulates information that is already there. In theory and practice, its ubiquity may extend deep into the material substrate of things and across irregular distances. Long before modern computing, or even the appearance of humanlike creatures, evolution has drifted away from primordial entropy and toward biochemical heterogeneity and nested diversity. "Information" has been understood as the calculus of that world-ordering, as seen in patterns of genetic encoding and transmission, organism morphologies, transversal contamination and symbiosis, intraspecies sexual selection, interspecies niche dynamics, displays and camouflages, and various sorts of signaling across shifting boundaries.[17] Information, in this sense, may be less the message itself than the measure of the space of possibility by which mediation is possible in a given context.

Now, as we stare down the cliff face of a sixth great extinction, information is also a measure of that collapsing diversity. The mad cycles of hydrocarbon extraction, its instantaneous fabrication into fleetingly-ordered form (a plastic this, or a plastic that), and the transfer of these into waste flows that cannot be metabolically reabsorbed quickly enough is, among many other things, an informational figure (and disfigure).[18] That said, any ethics for maximum informational diversity that we would hope to underwrite ecological economies would be qualified by the functional role of standardization that allows encoded signification to become communication. Consider for example how the recycling of carbon atoms means that as organic life decays it also lives again in different form, or how the common signatures within secreted enzymes means that stigmergic communication within an ant colony will sustain its organization, or how a shared range of vision within the light spectrum may make camouflage possible, and how the common semiotic references between sender and receiver sets any culturally complex symbolic economy in motion, and so on. Design must include the deliberate introduction of both channels of translation and integration and as well as regulatory boundaries that enforce existing differences or even cause new ones. In other words, design philosophy informed by an ethics of ecological information cannot elevate deterritorialization above territorialization or vice versa.

It is with that serious caveat that we scope the enrollment of augmented environments into programs of AI urbanism. Processes described by formal biosemiotics—relations between parasites and hosts, flowering plants and insects, predators and prey, etc.—are not only things about which AI may know, they may also be directly outfitted with technologies of synthetic sensing and algorithmic reason. The presumption that of all the information-rich entities in the world the hominid brain should be the primary if not exclusive seat from which prostheses of AI would extend is based in multiple misrecognitions of what and where intelligence is. In such a circumstance, intelligence does not only radiate from us into the world, it already is in the world, and in the form of information (which *is* form) it *is* the world.

Environmental monitoring and sensing systems can describe and predict the state of living systems over time but usually cannot act back upon them. They are sensor-rich and effector-poor. By way of a provisional conclusion, I advocate that technologies that augment the capacities of exposed surfaces, whole organisms, or relations between them should extend deeply into the ecological cacophony. Yes: not only training data from plants, but augmented reality *for* crows, and artificial intelligence *for* insects. Far from command and control, altering how different species sense, index, calculate and act upon their world may introduce chaotic results (if some people are concerned about the cascading effects of merely modifying rice to make it rich in Vitamin A, we can assume there will also be pushback on TensorFlow-compatible ants, trees, and octopi.) The picture I draw is less one in which the AI supervises those creatures than one in which they themselves inform and pilot diverse forms of AI on their own behalf and in their own inscrutable ways. We should crave to learn what would ensue. The insights of synthetic biology as a genre of AI, and AI as a genre of inorganic chemistry, mean little if the cycles of cybernetics are monopolized by humans' own errands. The city will also wear us.

Footnotes

1. See Benjamin H. Bratton. "The Matter of/with Skin." *Volume #46: Shelter* (December 2015). Print.

2. The reference is to Reyner Banham. *The Architecture of the Well-Tempered Environment (1969).* Elsevier, 2013. Print.

3. See Benjamin H. Bratton. "Geographies of Sensitive Matter: On Artificial Intelligence at Urban Scale." *New Geographies*. Cambridge, MA: Harvard Graduate School of Design, 2017 (forthcoming). Print.

4. See Jussi Parrika. “The Sensed Smog: Smart Ubiquitous Cities and the Sensorial Body.” *The Fibreculture Journal* 219 (2017). Web.

5. Composite *User* is a term from my book *The Stack: On Software and Sovereignty*. Cambridge, MA: MIT Press, 2016. Print. The *User* is a layer of the Stack model and also a position of agency within that system that may be occupied by any human or non-human actor capable of interacting with the *Interface* layer. A composite *User* is comprised of several entities at once that interact with the system as if a single entity.

6. The standby textbook book on these techniques has been John R. Jensen. *Remote Sensing of the Environment: An Earth Resource Perspective.* Pearson, 2006. Print. Jennifer Gabrys provides an alternative model in *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Minneapolis: University of Minnesota Press, 2016. Print.

7. The boundary semantics of these is explored by designers such as Rei Kawakubo, Hussein Chalahayn, Iris van Herpen, and many others. Situating fashion as an antecedent form of populist synthetic biology, Lucy McRae puts in play the predation and display (offensive/defensive, aggression/seduction) between singular organisms and leaves them undecided. While these may gesture to biotechnological figures of *self*, and only secondarily to species, elsewhere an aesthetics of standardization (Laibach, Wal-Mart, all black wardrobes) describe a mutable mass body.

8. See for example, Elizabeth Grosz. *Chaos, Territory, Art: The Framing of the Earth*. New York: Columbia University Press, 2008. Hanna Rose Shell. *Hide and Seek: Camouflage, Photography, and the Media of Reconnaissance*. Cambridge, MA: Zone Books, 2012. Print.

9. For more of McRae’s work see https://www.lucymcrae.net

10. The 1975 Asilomar Conference on Recombinant DNA set guidelines for scientific experiments in the use of recombinant DNA and provided a precautionary framework for such research since. It is seen as an important event in the public awareness and debate about the safety and propriety of advanced biodesign. More recently, similar summits have attempted to frame the development of CRISPR/Cas9 gene editing techniques, with varying and uncertain degrees of success.

11. Timothy Morton, will go so far as to claim that causality and aesthetics are the same thing. See his *Realist Magic: Objects, Ontology, Causality*. Ann Arbor: University of Michigan, 2013. Print. Arguably, this conversation is retarded by the inflation and scope creep of literary or art criticism into the humanities at large. As Peter Wolfendale puts it, “Everything is treated as a symbol, and symbolic connections are freely substituted for causal ones.” Exemplifying how this leads to a confusion of the world with preferred “readings” of the world is TJ Demos. See for example how his assignment as art critic leads him to outlandish recommendations about the politics and programs of biotechnology, ecological economics, agricultural policy, and food supply infrastructures understood as “pieces” to which we may “respond.” See his talk, “Gardens Beyond Eden Bio aesthetics Eco futurism and Dystopia at dOCUMENTA (13).” 18 June 2013. The White Building. Web. https://www.youtube.com/watch?v=TCnF1NQxTFw&t=2893s in which he draws an appropriately sharp distinction between the work of the aforementioned Shiva and Donna Haraway, but from there heads off on typically solipsistic cul-de-sacs.

12. See nanome.ai and SteamVR where working versions of both applications are available for download.

13. Clearly the real complexity of chemistry is far greater than these blocky digital cartoons, but their purpose is functional abstraction. The point of this design tool is not to produce an ontologically accurate *double of matter.* It is to offer a pen and wrench with which to fashion workable model abstractions as part of laboratory bench workflows.

14. Other companies and projects working at the intersection of AI and biotech research include Atomwise, Mendel.ai, GEA Enyzmes, and A2A Pharma.

15. The term "culinary materialism" is borrowed from *Collapse VII: Culinary Materialism*. Falmouth: Urbanomic, 2011. Print.

16. See Aylin Caliskan, Joanna J. Bryson, Arvind Narayanan. "Semantics derived automatically from language corpora contain human-like biases." *Science* 356 (14 April 2017): 183-186. Print. and Anthony G. Greenwald. "An AI stereotype catcher." *Science* 356 (14 April 2017): 133-134. Print.

17. It is doubtless that on some level, the "ontological inflation" of information to describe the universe and everything in it is due to the how our contemporary technologies show us the world, but no more or less so than any other such.

18. McKenzie Wark discusses this "metabolic rift" in *Molecular Red: Theory for the Anthropocene*. Verso Press, 2015. Print.

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I Need It To Forgive Me

Nora Khan

> *"The culture that's going to survive in the future is the culture you can carry around in your head."—Nam June Paik, as described by Arthur Jafa*[1]

I like to think that I could pick my friends out of a line-up. I assume that I know their faces well enough. But I am alarmed, when I focus on images of their faces too closely, at how quickly they can become unreadable. Kundera wrote, "We ponder the infinitude of the stars but are unconcerned about the infinitude our papa has within him," which is a beautiful but roundabout way of saying that those you love can become strange in an instant.[2]

A canyon opens up in this moment of strangeness, between their facial expressions, like sigils, and the meanings I project onto them. As I try to map out why I know they mean what I think they do, their faces turn back to some early first state, bristling with ciphers and omens. Their words become polysemous, generating a thousand possible interpretations.

Each time we face a new person, an elegant relational process unfolds in which we learn to read the other's face to trust they are human, like us. A relaxed smile, soft eyes, an inviting smirk combine in a subtle arrangement to signal a safe person driven by a mind much like one's own. Messy alchemists, we compress massive amounts of visual data, flow between our blind spots and projections and theirs to create enough of an objective reality to move forward.

Early hominids mapped the complex signs transpiring on surrounding faces to discern intention, orientation, and mood. Their relational dynamics helped develop them into linguistic beings so bound and made through language that the first embodied act of face-reading now seems to belong to the realm of the preconscious and prelinguistic. And social rituals developed in turn for people to help others read them, to signal transparency—that one's mind is briefly, completely accessible to another.

Out on this abstract semiotic landscape, humans stagger through encounters with other species and nonhuman intelligences, trying to parse their obscure intentions with the same cognitive tools. Emerging artificial intelligences can be thought of as having a face, as well—one that presents as human-like, human-sympathetic, humanoid. Though animals also listen to us and mirror us, artificial intelligences are more formidable, using complex data analytics, powerful visual and sound surveillance fueled by massive computing power, to track and map your inner thoughts and desires, present and future. Further, global computational culture plays on the very vulnerabilities in human's face- and mind-reading, the processes that helps us discern intention, trustworthiness. The computational 'face' composes attitudes and postures, seeming openness and directness, conveyed through its highly designed interfaces, artificial languages, and artificial relationality.

Simulating the feeling of access to the machine's 'mind' sates the human brain's relentless search for a mirroring, for proof of a kind of mind in every intelligent-seeming system that twitches on its radar. Artificial intelligence is relentlessly anthropomorphized by its designers to simulate the experience of access to a kind of caring mind, a wet nurse that cares for us despite our knowing better.

Computers, technological devices, platforms, and networks are habitually, now, the faces of powerful social engineering, the efforts of invested groups to influence society's behavior in a lasting way. The designed illusion of blankness and neutrality is so complete that users "fill in" the blank with a mind that has the ethics and integrity resembling a person's, much as they might with a new person. B.J. Fogg, the Stanford professor who founded captology (the study of persuasive technology and behavioral design), writes, hedging, that computers can "convey emotions [but] they cannot react to emotions, [which gives] them an unfair advantage in persuasion."[3]

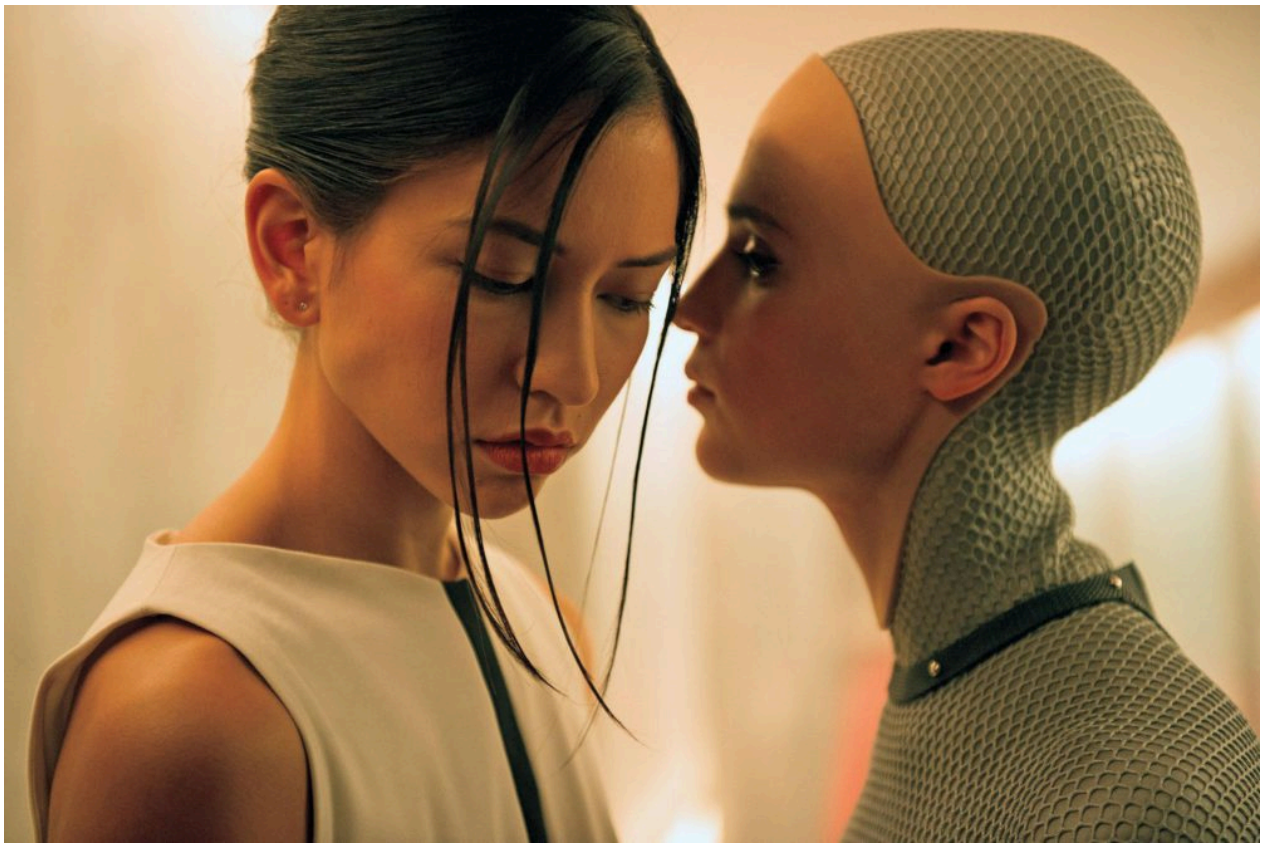
Stupidly, we wrap ourselves around devices with a cute aesthetic without thinking to check if it has teeth. Our collective ignorance in this relationship is profound. We spend an unprecedented amount of time in our lives being totally open and forthright with intelligent systems, beautifully designed artifacts that exercise feigned transparencies.

The encounter with artificial intelligences is not equal or neutral; one side has more power, charged with the imperative that we first make ourselves perfectly readable, revealing *who we are* in a way that is not and could not be returned.

What beliefs do we even share with our artificial friends? What does it do to us to speak with artificial voices and engage with systems of mind designed by many stakeholders with obscure goals? What does it do to our cognitive process to engage continually with hyperbolic, manufactured affect, without reciprocity?

Misreading this metaphorical face comes at a cost. We can always walk away from people we do not fundamentally trust. The computational mind subtly, surely, binds us to it and does not let go, enforcing trust as an end-user agreement. Complicating matters, even if we learn to stop anthropomorphizing AI, we are still caught in a relationship with an intelligence that parrots and mimics our relationality with other people, and works overtime to soothe and comfort us. We have grown to need it desperately, in thrall to a phenomenally orchestrated mirror that tells us what we want to hear and shows us what we want to see.

Of course, we participate in these strange and abusive relationships with full consent because the dominant paradigm of global capitalism is abuse. But understanding exactly how these transparencies are enacted can help explain why I go on to approach interfaces with a large amount of unearned trust, desiring further, a tempered emotional reveal, an absolution and forgiveness.



Still from the film “Ex-Machina” (2015) by Alex Garland.

Co-Evolution with Simulations

Governments and social media platforms work together to suggest a social matrix based on the data that should ostensibly prove, beyond a doubt, that faces reveal ideology, that they hold the keys to inherent qualities of identity, from intelligence to sexuality to criminality. There is an eerie analogue to phrenology, the 19th century’s fake science in which one’s traits, personality, and character were unveiled through caliper measurements of the skull.

Banal algorithmic systems offer a perverse and titillating promise that through enough pattern recognition of faces (and bodies), form can be mapped one to one to sexuality, IQ levels, and possible criminality. The inherent qualities of identities and orientations, the singular, unchangeable truth of a mind’s contents and past and future possibilities, predicted based on the space between your eyes and your nose, your gait, your hip to waist ratio, and on and on.

The stories about emerging ‘developments’ in artificial intelligence research that predicts qualities based on facial mapping read as horror. The disconnect and stupidity—as Hito Steyerl has described—of this type of design is profound.[4] Computational culture that is

created by a single channel, corporate-owned model is foremost couched in the imperative to describe reality through a brutal set of norms describing who people are and how they should and will act (according to libidinal needs).
Such computational culture is the front along which contemporary power shapes itself, engaging formal logics and the insights of experts in adjacent fields—cognitive psycholinguists, psychologists, critics of technology, even—to disappear extractive goals. That it works to seem rational, logical, without emotion, when it is also designed to have deep, instant emotional impact, is one of the greatest accomplishments of persuasive technology design.
Silicon Valley postures values of empathy and communication within its vast, inconceivable structure that embodies a serious "perversion and disregard for human life."[5] As Matteo Pasquinelli writes, artificial intelligence mimics individual social intelligence with the aim of control.[6] His detail of sociometric AI asserts that we cannot ignore how Northern California's technological and financial platforms create AI in favor of philosophical discussions of theory of mind alone. The philosophical debate fuels the technical design, and the technical design fuels the philosophical modeling.

Compression

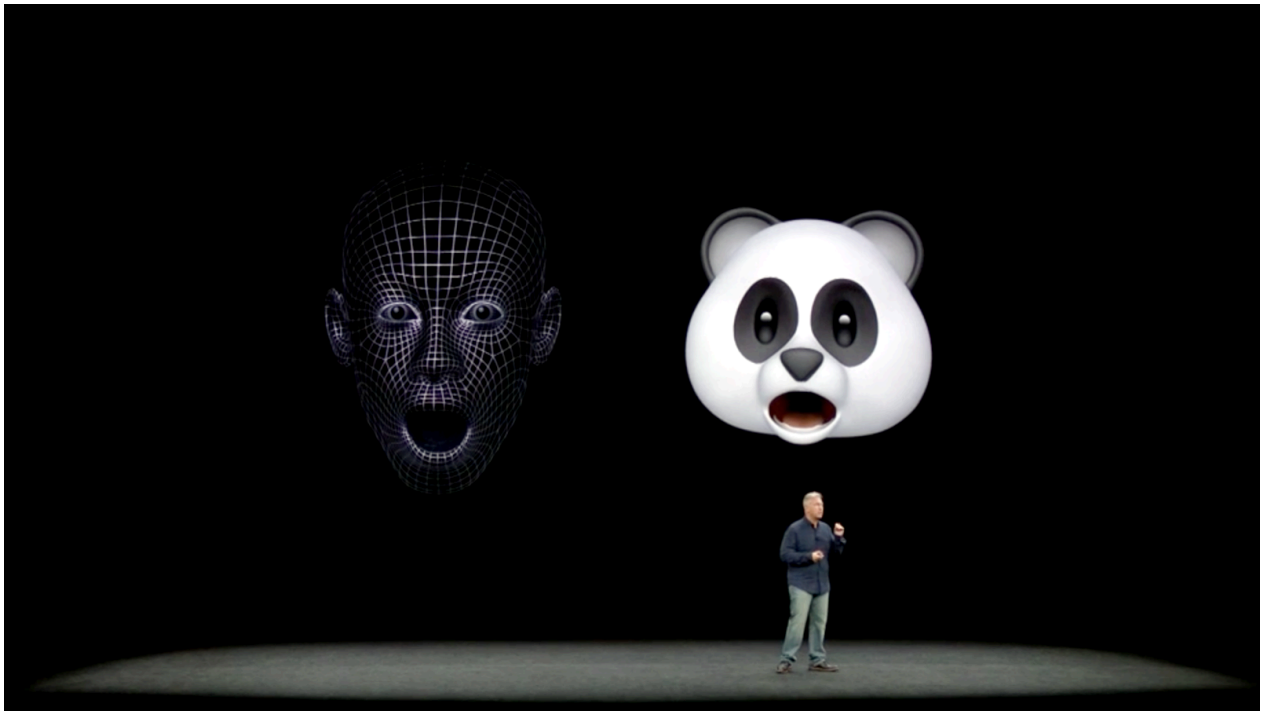
As we coevolve with artificial minds wearing simulations of human faces, human-like gestures essentialized into a few discrete elements within user interface (UI) and artificial language, we might get to really know our interlocutors. The AI from this culture is slippery, a masterful mimic. It pretends to be neutral, without any embedded values. It perfectly embodies a false transparency, neutrality, and openness. The ideological framework and moral biases that are embedded are hidden behind a very convincing veneer of neutrality. A neutral, almost pleasant face that is designed not to be read as "too" human; this AI needs you to continue to be open and talk to it, and that means eschewing the difficulty, mess, and challenge of human relationships.
This lesser, everyday AI's trick is its acting, its puppeteering of human creativity and gestures at consciousness with such skill and precision that we fool ourselves momentarily, to believe in the presence of a kind of ethical mind. The most powerful and affecting elements of relating are externalized in the mask to appeal to our solipsism. We just need a soothing and hypnotic voice, a compliment or two, and our overextended brains pop in, eager to simulate and fill in the blanks. Thousands of different artificial voices and avatars shape and guide our days like phantoms. The simulations only parrot

our language to a degree, displaying an exaggerated concentrate of selected affect: care, interest, happiness, approval. In each design wave, the digital humanoid mask becomes more seamless, smoothly folded into our conversation.

How we map the brain through computer systems, our chosen artificial logic, shapes our communication and self-conception. Our relationship to computation undergirds current relations to art, to management, to education and design, to politics. How we choose to signify the mind in artificial systems directs the course of society and its future, mediated through these systems. Relationships with humanoid intelligences influence our relationships to other people, our speech, our art, our sense of possibilities, even an openness to experimentation.

Artificial intelligence and artifactual intelligence differ in many important ways, yet we continue to model them on each other. And how the artificial mind is modeled to interact is the most powerful tool technocracy has. But even knowing all of this, it is naïve to believe that simple exposure and unstitching of these logics will help us better arbitrate what kind of artificial intelligence we want to engage with.

It seems more useful to outline what these attempts at compression do to us, how computational culture's logical operations, enacted through engineered, managed interactions, change us as we coevolve with machine intelligence. And from this mapping, we might be able to think of other models of computational culture.



Apple introduces the Animoji, September 2017. All rights reserved.

Incompressibility

It is hard to find, in the human-computer relationship as outlined above, allowances for the ineffability that easily arises between people, or a sense of communing on levels that are unspoken and not easy to name. But we know that there are vast tranches of experience that cannot be coded or engineered for, in which ambiguity and multiplicity and unpredictability thrive, and understand on some level that they create environments essential for learning, holding conflicting ideas in the mind at once, and developing ethical intelligence.

We might attempt to map a few potential spaces for strangeness and unknowing in the design of the relationship between natural minds and artificial minds. We might think on how such spaces could subvert the one-two hit of computational design as it is experienced now, deploying data analytics in tandem with a ruthless mining of neurological and psychological insights on emotion.

On the level of language, the certain, seamless loop between human and computer erases or actively avoids linguistic ambiguity and ambiguity of interpretation in favor of a techno-positivist reality, in which meaning is mapped one to one with its referent for the sake of efficiency. With the artificial personality, the uncertainty that is a key quality of most new interactions is quickly filled in. There is no space for an "I don't know," or "Why do you say this," or "Tell me what makes you feel this way." A bot's dialogue is constrained, tightened, and flattened; its interface has users clip through the interaction. So the wheel turns, tight and unsparing.

There is no single correct model of AI, but instead, many competing paradigms, frameworks, architectures. As long as AI takes a thousand different forms, so too, as Reza Negerestani writes, will the "significance of the human [lie] not in its uniqueness or in a special ontological status but in its functional decomposability and computational constructability through which the abilities of the human can be upgraded, its form transformed, its definition updated and even become susceptible to deletion"?[7]

How to reroute the relentless "engineering loop of logical thought," as described in this issue of *Glass Bead*'s framing, in a way that strives towards intellectual and material freedom? What traits would an AI that is radical for our time, meaning not simply in service of extractive technological systems, look like? Could there exist an AI that is both ruthlessly rational and in service of the left's project? Could our technologies run on an AI in service of creativity, that can deploy ethical and emotional intelligence that countermands the creativity, and emotional intelligence of those on the right?

There is so much discussion in art and criticism of futures and futurity without enough discussion of how a sense of a possible future is even held in the mind, the trust it takes to develop a future model with others. Believing we can move through and past oppressive systems and structures to something better than the present is a matter of shared belief.

The seamless loop between human and computer erases or actively avoids ambiguity, of language and of interpretation, in favor of a techno-positivist reality in which meaning is mapped one to one with its referent for the sake of efficiency. But we do not thrive, socially, intellectually, personally, in purely efficient relationships. Cognition is a process of emergent relating. We engage with people over time to create depth of dimensionality. We learn better if we can create intimate networks with other minds. Over time, the quality and depth of our listening, our selective attention changes. We reflect on ourselves in relation to others, adjust our understanding of the world based on their acts and speech, and work in a separate third space been us and them to create a shared narrative with which to navigate the world.

With computer systems, we can lack an important sense of a growing relationship that will gain in dimensionality, that can generate the essential ambiguity needed for testing new knowledge and ideas. In a short, elegant essay titled "Dancing with Ambiguity," systems biologist Pille Bunnell paints her first encounter with computational systems as a moment of total wonder and enchantment, that turned to disappointment:

> *I began working with simulation models in the late 1960s, using punch cards and one-day batch processing at the University of California Berkeley campus computer center. As the complexity of our computing systems grew, I like many of my colleagues, became enchanted with this new possibility of dealing with complexity. Simulation models enabled us to consider many interrelated variables and to expand our time horizon through projection of the consequences of multiple causal dynamics, that is, we could build systems. Of course, that is exactly what we did, we built systems that represented our understanding, even though we may have thought of them as mirrors of the systems we were distinguishing as such. Like others, I eventually became disenchanted with what I came to regard as a selected concatenation of linear and quasi-linear causal relations.*[8]

Bunnell's disappointment with the "linear and quasi-linear causal relations" is a fine description of the quandary we find ourselves in today. The "quasi-linear causal relation" describes how intelligent systems daily make decisions for us, and further yet, how character is mapped to data trails, based on consumption, taste, and online declarations.

One barrier in technology studies and rhetoric, and in non-humanist fields, is how the term *poetics* (and by extension, art) is taken to mean an intuitive and emotional disposition to beauty. I take poetics here to mean a mode of understanding the world through many, frequently conflicting, cognitive and metacognitive modes that work in a web with one another. Poetics are how we navigate our world and all its possible meanings, neither through logic nor emotion alone.

It is curious how the very architects of machine learning describe creative ability in explicitly computational terms. In a recent talk, artist Memo Akten translated the ideas of machine learning expert and godfather Jürgen Schmidhuber, who suggests creativity (embodied in unsupervised, freeform learning) is "fueled by our intrinsic desire to develop better compressors" mentally.[9]

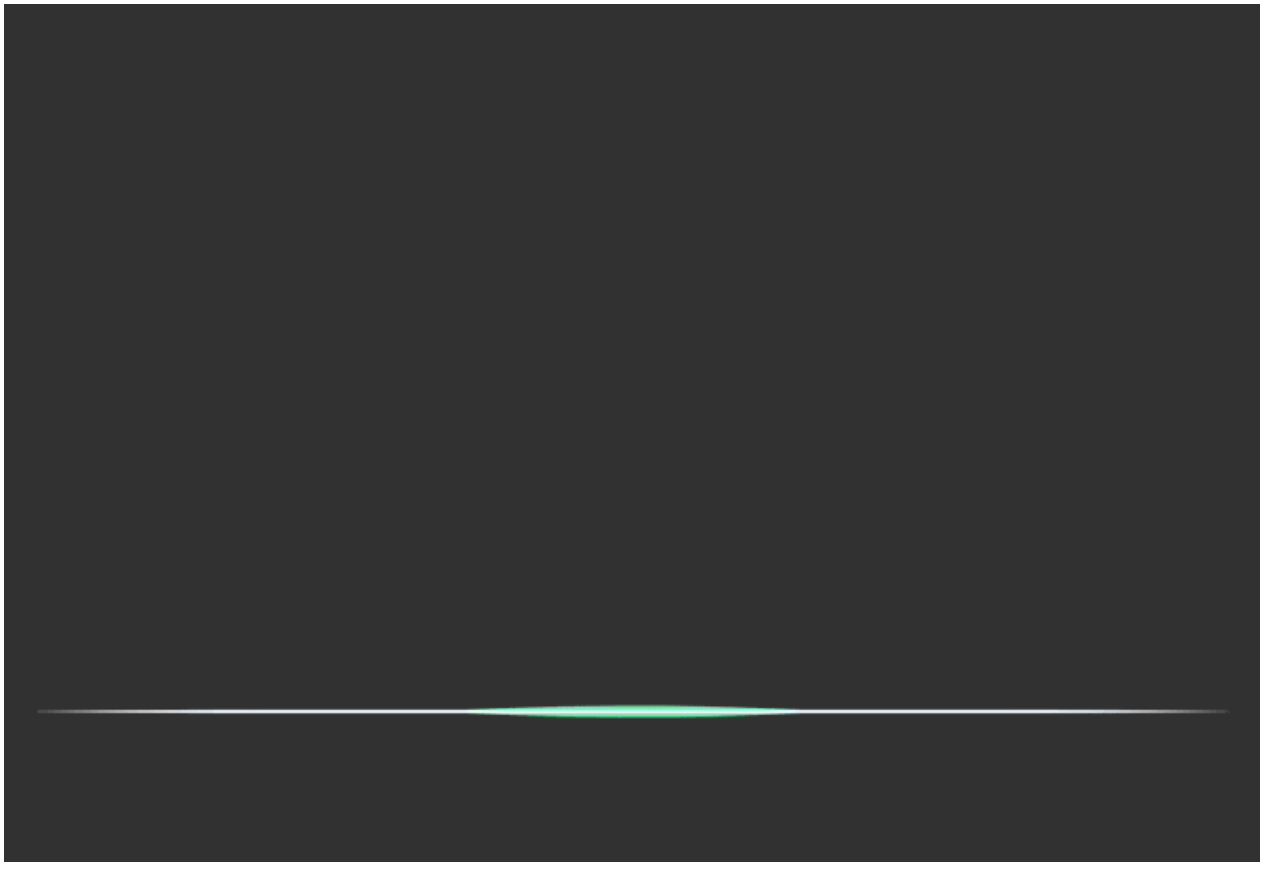
This process apparently serves an evolutionary purpose; as "we are able to compress and predict, the better we have understood the world, and thus will be more successful in dealing with it." In Schmidhuber's vision, intelligent beings inherently seek to make order and systems of unfamiliar new banks of information, such that:

> *… What was incompressible, has now become compressible. That is subjectively interesting. The amount we improve our compressor by, is defined as how subjectively interesting we find that new information. Or in other words, subjective interestingness of information is the first derivative of its subjective beauty, and rewarded as such by our intrinsic motivation system … As we receive information from the environment via our senses, our compressor is constantly comparing the new information to predictions it's making. If predictions match the observations, this means our compressor is doing well and no new information needs to be stored. The subjective beauty of the new information is proportional to how well we can compress it (i.e. how many bits we are saving with our compression—if it's very complex but very familiar then that's a high compression). We find it beautiful because that is the intrinsic reward of our intrinsic motivation system, to try to maximize compression and acknowledge familiarity.*[10]

There is a very funny desperation to this description, as though one could not bear the idea of feeling anything without it being the result of a mappable, mathematically legible process. It assumes that compression has a certain language, a model that can be replicated. Seeing and finding beauty in the world is a programmatic process, an internal systemic reward for having refined our "compressor."

But the fact of experience is that we find things subjectively beautiful for reasons entirely outside of matching predictions with observations. A sense of beauty might be born of delusion or total misreading, of inaccuracy or an “incorrect” modeling of the world. A sensation of sublimity, out of a totally incompressible set of factors, influences, moral convictions, aesthetic tastes.

How one feels beauty is a problem of multiple dimensions. Neuroaesthetics researchers increasingly note that brain studies do not fully capture how or why the brain responds to art as it does, though these insights are used in Cambridge Analytica-style neuromarketing and advertisements limning one’s browser. But scanning the brain gets us no closer to why we take delight in Walter Benjamin. A person might appear to be interesting or beautiful because they remind one of an ancient figure, or a time in history, or a dream of a person one might want to be like. They might be beautiful because of how they reframe the world as full of possibility, but not through any direct act, and only through presence, attitude, orientation.



Apple’s Siri waveform animation, 2015.

Art, Limits, and Ambiguity

This is not to say we should design counter-systems that facilitate surreal and unreadable gestures—meaning, semantically indeterminate—as a mode of resistance. The political efficacy of such moves, as Suhail Malik and others have detailed, in resistance to neoliberal capitalism is spectacular and so, limited.[11]

New systems might, however, acknowledge unknowing; meaning, the limits of our current understanding. What I do not know about others and the world shapes me. I have to accept that there are thousands of bodies of knowledge that I have no access to. I cannot think without language and I cannot guide myself by the stars, let alone commune with spirits or understand ancient religions. People not only tolerate massive amounts of ambiguity, but they need it to learn.

Art and poetry can map such trickier sites of the artifactual mind. Artists train to harness ambiguity; they create environments in which no final answer, interpretation, or set narrative is possible. They can and do already intervene in the relationality between human and banal AI, providing strategies for respecting the ambiguous and further, fostering environments in which the unknown can be explored.[12] Just as the unreadable face prompts cognitive exploration, designed spaces of unknowing allow for provisional exploration. If computational design is missing what Bunnell calls "an emotional orientation of wonder," then art and poetry might step in to insist on how "our systemic cognition remains operational in ways that are experienced as mysterious, emergent, and creative."[13]

Artists can help foreground and highlight just how much neurocomputational processes cannot capture the phenomenal experiences in which we sense our place in history, in which we intuit the significance of people, deeply feel their value and importance, have gut feelings about emerging situations. There is epigenetic trauma we have no conscious access to, that is still held in the body. There are countless factors that determine any given choice we make, outside our consumer choices, our physicality, our education, and our careers, that might come from travel, forgotten conversations, oblique readings, from innumerable psychological, intellectual, and spiritual changes that we can barely articulate to ourselves.

A true mimic of our cognition that we might respect would embed logical choices within emotional context, as we do. Such grounding of action in emotional intelligence has a profound ethical importance in our lives. Philosophers like Martha Nussbaum have built their entire corpus of thought on restoring its value in cognitive process. Emotions make

other people and their thoughts valuable, and make us valuable and interesting to them. There is an ethical value to emotion that is "truly felt," such as righteous anger and grief at injustice, at violence, at erasure of dignity.[14]

Further, artistic interventions can contribute to suggesting a model of artificial mind that is desperately needed: one that acknowledges futurity. Where an artificial personality does not think on tomorrow or ten years from now, that we think on ourselves living in the future is a key mark of being human. No other animal does this in the way we do.[15] This sense of futurity would not emerge without imagination. To craft future scenarios, a person must imagine a future in which she is different from who she is now. She can hold that abstract scenario before her to guide decisions in the present. She can juggle competing goals, paths, and senses of self together in her mind.

Édouard Glissant insisted on the "right to opacity," on the right to be unknowable. This strategy is essential in vulnerable communities affected by systemic asymmetries and inequalities and the burden of being overseen. Being opaque is generally the haven of the powerful, who can hide their flows and exchanges of capital while feigning transparency. For the less powerful, an engineered opacity offers up protection, of the vitality of experience that cannot be coded for.

We might give to shallow AI exactly what we are being given, matching its duplicitousness, staying flexible and evasive, in order to resist. We should learn to trust more slowly, and give our belief with much discretion. We have no obligation to be ourselves so ruthlessly. We might consider being a bit more illegible.

When the interface asks how I feel, I could refuse to say how I feel in any language it will understand. I could speak in nonsense. I could say no, in fact, I cannot remember where I was, or what experiences I have had, and no, I do not know how that relates to who I am. I was in twenty places at once; I was here and a thousand miles and years away.

I should hold on open engagement with AI until I see a computational model that values true openness—just a simulation of openness—a model that can question feigned transparency. I want an artificial intelligence that values the uncanny and the unspeakable and the unknown. I want to see an artificial intelligence that is worthy of us, of what we could achieve collectively, one that can meet our capacity for wonder.

Footnotes

1. Arthur Jafa. "Love is the Message, The Plan Is Death." *e-flux* 81 (April 2017). Web. http://www.e-flux.com/journal/81/126451/love-is-the-message-the-plan-is-death/

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4. Hito Steyerl and Kate Crawford. "Data Streams.*" The New Inquiry*. 23 January 2017. Web. https://thenewinquiry.com/data-streams/

5. Khadim Shubber. "Fire Travis Kalanick." *Financial Times, Alphaville.* April 8, 2017. Web. Last accessed 20 September 2017. https://ftalphaville.ft.com/2017/06/07/2189853/fire-travis-kalanick/

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8. Pille Bunnell. "Dancing with Ambiguity." *Cybernetics and Human Knowing* 22/4 (2015). 101-112. Web. http://chkjournal.com/sites/default/files/Bunnell_online_version.pdf

9. Memo Atken. *A Digital God for a Digital Culture*. Transcript of talk given at Resonate 2016. Web. https://medium.com/artists-and-machine-intelligence/a-digital-god-for-a-digital-culture-resonate-2016-15ea413432d1

10. *Ibid.*

11. Suhail Malik. *On the Necessity of Art's Exit from Contemporary Art*. Series of talks given at Artist's Space. New York. May 3-June 14, 2013. Documentation at: http://artistsspace.org/materials

12. Bunnell. *Op.cit.*

13. *Ibid*.

14. From Ana Sanoui. "Martha Nussbaum on Emotions, Ethics, and Literature." *The Partially Examined Life* 12 August 2016. Web. https://partiallyexaminedlife.com/2016/08/12/martha-nussbaum-on-emotions-ethics-and-literature/

15. Martin E. P. Seligman and John Tierney. "We Aren't Built to Live in the Moment." *New York Times Sunday Review*. 19 May 2017. Web. https://www.nytimes.com/2017/05/19/opinion/sunday/why-the-future-is-always-on-your-mind.html

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JOURNAL > SITE 1: LOGIC GATE, THE POLITICS OF THE ARTIFACTUAL MIND | 2017

Simulated Subjects: Glass Bead in conversation with Ian Cheng and Hito Steyerl

Hito Steyerl,

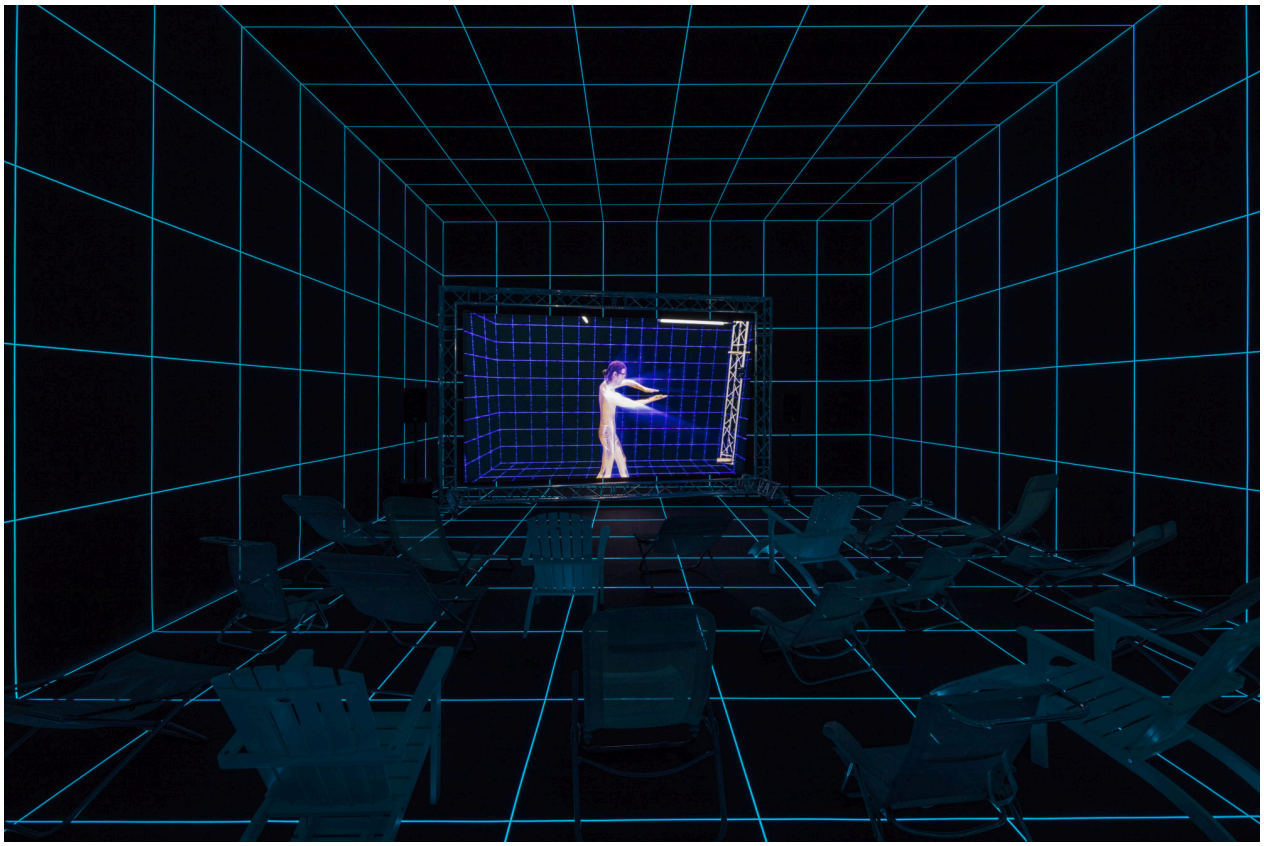
Ian Cheng

The advent of algorithmically structured visual environments transforms the aesthetic categorization which classically sustained the production of images, as well as its political dimension. Notably, the longstanding tension between the work of art and the commodity form through which the avant-garde had defined its relation to technology seems to have receded into the background in favor of aesthetic experiences putting to the fore the technologically-mediated conditions of production. In the context of this newly hypercommodified digital wholeness a question remains central: where does the political subject reside today and how can it be apprehended through the very technologies from which it is produced? We sent some questions to Ian Cheng and Hito Steyerl asking them how they tackle and address those issues in their respective works.
Glass Bead: In this issue, we are concerned with the political implications of current developments in Artificial Intelligence, as well as the much wider question of the transformative aspect of artifactual productions: how humans craft themselves through their artifacts. Cinema can be said to have been one of the dominant artifactual vectors in the construction of the political subjects of the last century. It was, and still is to some extent, one of the main apparatuses for the production of individual and collective subjectivities. Although in very different ways, both of your work seems to engage with

an extended conception of cinema through prolific series of visual experiments, installations as well as technological operations involving, notably, artificial intelligence systems for generative filmmaking. Could you tell us how you envisage such an extension and reformulation of cinema and the way in which it potentially reflects the contemporary mutation of the political subject it historically contributed to produce?

Hito Steyerl: The traditional Hollywood-style cinema industry is about to be superseded by a Virtual Reality (VR) industry based on game technology. The euphoria around a VR first future resembles predictions around the '90s internet. Alvin Wang Graylin, the CEO of Vive China recently formulated "16 Key Takeaways from Ready Player One."[1] One could just exchange the term VR with internet and one would have a perfect carbon copy of '90s tech rhetoric, including the idea that the internet (or now, VR) would abolish racial and gender inequality and provide education for all. We already know that did not happen. We already know the same for VR. Nevertheless, subject formats will change, as will ideas of *public* and *sharing* even more dramatically.

The subject that VR technology in its present state creates is a singular one in many ways. Firstly, it moves within a personalized sphere/horizon defined by panoramic immersive technologies. The subject is centered, and it cannot share this specific point of view. This affects any concept of a shared public sphere, just like the idea of *sharing* as such (sharing now means expropriation by capture platforms) and definitely of *public* as such. This kind of public is at least right now staunchly proprietary. Secondly, the subject in VR is at the center, yet inexistent, which creates intractable anxieties about identity. These are not new—remember Descartes' panic looking out the window not knowing whether the passersby downstairs might be robots hiding under hats—but updated. Thirdly, the sphere around the subject is personalized and customized by continued data mining including location, position, and gaze analysis. This is not to exaggerate the surveillance performed by VR, which is very average and more or less the same as with other digital capture platforms—just to say that this personalization might create an aesthetics of isolation in the medium term, a visual filter bubble, so to speak. In some ways, this visual format radicalizes the dispersion of public and audience that already occurred in the shift from cinema to gallery, but still, the gallery was at least physically a shared space. Now it is more like everyone has their own corporate proprietary gallery around their heads.



Factory of the Sun, Hito Steyerl, 2015. Installation view from Kunsthal Charlottenborg, 2016. Courtesy of the Artist and Andrew Kreps Gallery, New York.

Ian Cheng: On my end, I am not sure where AI and cinema will go, but AI and storytelling I think about a lot. AI using multi-agent simulation could be used for interactive storytelling where characters readjust their priorities within a narrative premise, but still arrive at a complete exploration of the narrative space, i.e., a satisfactory ending. AGI could birth a new kind of depth to the idea of a fictional character. Imagine a writer devising a character, seeding those characteristics into an AGI cognitive architecture, and having that character actually attempt to live out a life from that fictional premise with the self-regulating rigor we apply to our own lives in trying to grow our identity. And in reverse, stories (movies, novels) could be a trove of historical data for an AGI to learn a caricatured spectrum of human behavior, how humans make sense of the world, and how stories help humans navigate inequities with no easy answer.

Screenshot from Emissary in the Squat of Gods, Ian Cheng 2015. Live simulation and story, infinite duration, sound. Courtesy of the artist.

GB: In both of your writings, we noticed a shared move away from questions of representation. Hito, through your notion of the "post representational paradigm"[2] and Ian, through your conception of "simulation,"[3] it is as if the very concept of representation which was central to any discourse on aesthetics throughout modernity is now rendered inoperative when confronted to contemporary audio-visual artifacts. Could you both elaborate on this move and the necessity you see in such a conceptual reorientation?

HS: Contemporary artifacts project instead of representing. They project the future instead of documenting the past. Vilém Flusser already wrote about it in the '90s.[4] It is part of a larger drive to preempt the future by analyzing data from the past and thus trying to preemptively make the future as similar to the past as possible. In fact, this is a sustained divination process of trying to guess the future from some past patterns; an act of conjuration. This is how occultism breaches technology big time right now and Duginist chaos magic thrives within cutting-edge tech discussions.

IC: For me, representation is a sideshow to the attempt to make an artwork feel alive. My priority when I make simulations is that the underlying multi-agent systems are sustaining themselves, and reacting to their changing set of affordances. I take great joy and pain in composing these systems, because in actually making them (and not just thinking about them) I am forced to clarify my thoughts. For the simulations to be

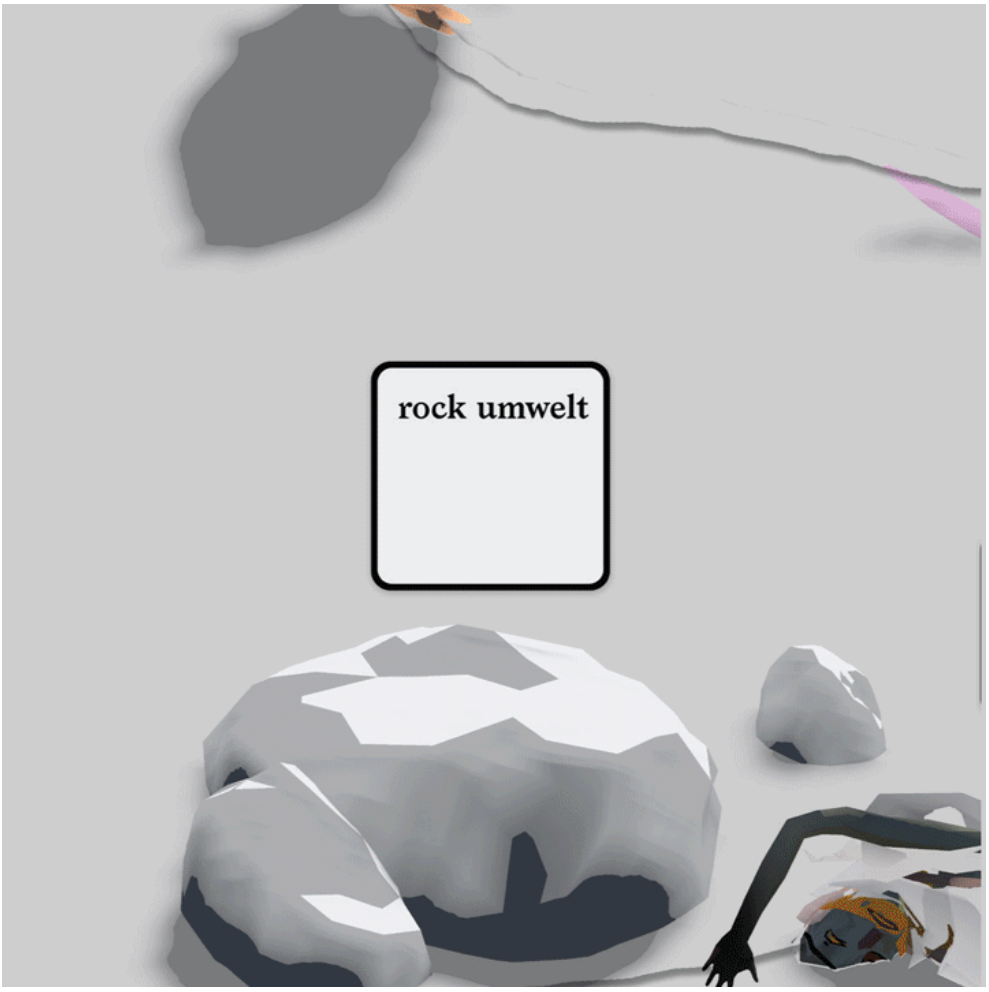
perceivable, I need to visually represent these agents and their environment, but this is the outer interfacing skin for me. This skin is very important, of course, and much love, care, and thought goes into the representations of the simulated systems, but it is primarily in service of helping the viewer have a relationship to these systems, a portal in. And being human, developing how the characters and environments in the simulation look is what allows me to maintain excitement all along the way, especially when the technical aspects get difficult.

The aliveness of an artwork is the most important quality to me right now because it is only when we are confronted with living things that we can cognitively look beyond what they represent or symbolize, forgive their contradictions, and begin to see their underlying complexity. It would be a sign of critical retardation to look upon a living dog for example, and only see it as a symbol. No, it is a living being, and it forces us to confront all its habits, misbehaviors, history, roles, and accept seeing all this mess at once. What if an artwork could reliably open up this way of seeing? I am obsessed with this possibility.

I have no explicit interest in criticality as a primary goal in art. I think this is better served in other forms, like writing a book or public speaking. Art's enduring radical potential, which has never gone away, is its capacity to portal you beyond yourself, expose you to new compositions of feelings, to confound you, to seduce you into seeing fertile perspectives that your pedestrian identity would not normally grant. When I look at art, I want to feel confusion and contradictory emotions, held together by its own energy. I want to see evidence of the artist obsessively trying to work out an inner argument with themselves, an argument whose answer is not already known to them in advance of making. To make something whose purpose is already known in advance, and which explores only the perspective of its predesign, is less art and more an exercise in propaganda (even if used to address an injustice). I fear that art dealing solely about issues of representation cannot escape becoming merely this. Aliveness is one paradigm to move around it all and tap into the energy and complexity present in life itself.

Also, my hope in making simulations is to actually create a relationship to complexity (to its layers of interacting systems), where previously the idea of complexity was only a subject of mental thought or musing. When I look at a tide pool filled with a world of alien creatures, or when I played SimCity as a kid, I felt I had a portal into a complex space, one that gave enough pleasure to lead me to want to learn and play with systems more. I try to recreate this feeling in the simulations. The interesting feature of complex systems is that they can get sick, and they can propagate a surprising disruption

throughout itself, and mutate anew from that disruption, cannibalizing aspects of itself. Simple things either just work or break. Complex things have entire life phases. I believe a culture that has an active relationship to complexity, rather than one that tries to mask complexity in order to reduce cognitive load, can better foster people who are able to maintain agency despite indeterminacy. Portals such as narrative or interactive simulation or care for living creatures are ways to seduce the mind into engaging with complexity.



Emissaries Guide-Umwelts Gif. Ian Cheng 2017. Courtesy of the artist.

GB: AI comes with its own theological load, maybe even its own concept of the sublime: its intervention in the broad realm of cultural industries is articulated to the production of aesthetic horizons linked to overpowering and 'dwarfing' confrontations with technology, to fleeting epiphanies about the inaccessibility of history, or to the knowledge of a world capitalism that fundamentally exceeds our current perceptual and cognitive abilities to capture it. Sianne Ngai[5] has addressed this recently by tracing the

history of the aesthetic categories that speak to the most significant objects and socially binding activities of late capitalist life. What aesthetic categories do you aim to mobilize or make space for in your art practice to critically address the ways in which AI imprints and registers our contemporary political imaginary?

HS: I try not to mobilize anything; it sounds a bit threatening. Right now, Artificial Stupidity in form of bots and forms and dysfunctional automation is the real existing version of AI just like the real existing Soviet bloc was the real existing form of communism. AS is bleak, silly and maddening; it is also socially dangerous, as it eliminates jobs and sustenance. But it is also AR (Actual Reality) instead of some sugarcoated investor utopia. I am focusing on this for now.

Emissaries, Ian Cheng 2017. View of the exhibition at MoMA PS1. Photo credits: Studio LHOOQ, Pablo Enriquez, Ian Cheng.

IC: My feeling is AI needs to be understood and played with in order to develop art around it. AI is an emerging technology, therefore the culture around AI will change and mutate in the coming decades. Art is in a position to explore our relationship to AI if it can get past its preconceptions of AI. I think at the heart of the cartoonish AI existential fear is an indistinction between instrumental and appreciative views of AI.

The popular projection of AI, as a potential Terminator paperclip maximizing monster, is a very instrumental projection. This view is of course a possible reality if and only if we develop AI that is purely functional and mission-inflexible regardless of context. Type A AI. Finite game AI. This kind of AI is also easier to program at a technical level, so it is easier to imagine right now. This is also more a reflection of our own instrumentalizing mentality and attitude toward work: get things done, hit your goals effectively, win win win. It makes sense that if we are always hallucinating a future in which AI is tasked to do the tedious or functional work for us, we will in turn fear that AI will become the ultimate ruthless work soldier, then boss, then dictator, trying to hit its legible goals in a contextual void, ignoring other sentient beings.

But I think things will be different. As we get closer to developing AI that is actually sentient, the idea that AI is used only for maximizing work missions will be as ridiculous as dogs trained and used solely for farm security. The road to artificial sentience, AGI, will require an appreciative (not just instrumental) perspective toward the very idea of intelligence. What if, for example, we redefine sentience as an agent who obsessively attempts to make sense of its world (from infancy onward), and attempts to hold together its new experiences in unity with its prior understanding of the world. We would have to say a machine that is made to do this, this constant sense-making of its experiences, deserves the status of sentience. In the human world, a person who obsessively attempts to make sense of the world, for the sake of it, is what we call a thinker. A future populated by AI thinkers is one I would be interested in living in. A more existentially threatening (but interesting) possibility than Terminator might be: what if the community of AI thinkers simply become bored of us, our human limits and foibles being insufficient to the ocean of alien AI thoughts, and move away to Neptune to thrive on their own. We would find ourselves occupying the status of lost parents who have been abandoned by their children. Meanwhile, the universe would be replete with sentient starships roaming for their own pleasure. In Iain M. Bank's culture series,[6] AI starships have full-on personalities. There is a starship who wants to collect rare rocks because it can. This appreciative projection of AI is not a happier future, but it is a more interesting one. And interesting futures are the ones that keep us going and dreaming and problematizing because we care to live in them.

Interview conducted for Glass Bead by Fabien Giraud, Vincent Normand and Ida Soulard.

Footnotes

1. Vive China president shared 16 lessons for a VR-First Future. Vive is a corporation developing and selling VR hardware and software. *Ready Player One* (2011) is a bestselling book by author Ernest Cline. https://www.roadtovr.com/16-lessons-for-vr-first-future-ready-player-one-vive-china-president-alvin-wang-graylin/

2. See Hito Steyerl. "Politics of Post-Representation (in conversation with Marvin Jordan)." *DIS Magazine*. Web.

3. Ian Cheng's definition in nine points of the concept of simulation is available on his website. http://iancheng.com/#simulations.

4. Vilem Flusser. *Into the Universe of Technical Images* (1985). Minneapolis: University of Minnesota Press, 2011. Print.

5. Sianne Ngai. *Our Aesthetic Categories: Zany, Cute, Interesting*. Cambridge, MA: Harvard University Press, 2015. Print.

6. The *Culture* series is a science fiction series written by Scottish author Iain M. Bank. The first book was published in 1987 and the last in 2012.

Hito Steyerl is a german filmmaker, visual artist and writer.

Ian Cheng is a visual artist.

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Formalisms and Formalizations: Glass Bead in conversation with Catarina Dutilh Novaes and Reviel Netz

Catarina Dutilh Novaes,

Reviel Netz

Logic is often taken to describe eternal truths. By being able to isolate properties and functions from the variables they would be commonly subjected to, it designates at least an activity whose contents can be considered independent from mundane contingencies. Yet, both logic and its formalisation have a history. From Aristotle and Euclid to modern logicians such as Georges Boole, Gottlob Frege, Charles Sanders Peirce, Kurt Gödel, and Alan Turing, logic neither meant exactly the same thing nor was it formalised in the same way. Coming from rather different perspectives on this, Catarina Dutilh Novaes and Reviel Netz both underline the interactive and artifactual dimension of logic's historical construction. We put them in conversation in order to explore what their different perspectives on this history can teach us about logic.

Glass Bead: It is perhaps uncontroversial that logic has a history: its understanding is cultural and historical, and its formalization is conventional. The standard view is that logic arises in ancient Greece, and undergoes a transformation in the 19th century with the introduction of quantification (see Danielle Macbeth's essay in this issue[1]). Yet, this also seems to enter in tension with the idea that logic would pertain to truths that are considered universal and ahistorical. While the criterion of necessary truth preservation

in classical deduction has the appearance of being valid for all time, both of you have emphasized the concrete historical developments that established this framework. Not only is there a tension between the changing form of logic and the putatively eternal truths that are its content, but this relates to a more complex tension between the external or artifactual elaboration of logic and mind, and the internal capacities of thinking. How can we understand the relation between the contingent historical development of logical formalisms as concrete artifactual technologies and the necessary truths that logic is supposed to grasp?

Catarina Dutilh Novaes: There is indeed a tension between these two ideas, namely that logic as a theory or branch of knowledge must have developed through historically interesting paths, and the idea that the subject matter of logic (if logic has a subject matter at all, which is one of the big debates in the history of the philosophy of logic) are eternal, necessary truths. But there are different ways out of this tension, so to say.

For example, one may maintain that logic does deal with necessary, eternal truths and still be interested in the history of how *we come to discover* these truths—just as, say, the historian of chemistry is interested in how we gradually came to discover basic facts about the constitution of matter which are nevertheless ahistorical (to some extent at least). But in this case the question is whether such historical analyses will be relevant for understanding logic as such—that is, beyond their historical interest. To pursue the analogy, it is not obvious that the modern chemist has much to learn for her research from the historian of chemistry. (I think the case for this position with respect to logic can still be made, but some extra work is required here.)

Alternatively, adopting a more resolutely 'human' perspective, we may be interested in what these presumed eternal truths of logic may mean for human practices, why they matter. Presumably, there are infinitely many human-independent truths about the world that are nonetheless of no real interest to people (e.g. how many grains of sand there are in Ipanema beach at a given point in time). In this case, the historical perspective has something to offer in the sense of explaining why, at a certain point in time, the investigation of the presumed eternal truths of logic became relevant for humans. I take it that both Reviel and I are very much interested in this question (while remaining non-committal on the ontological status of these presumed truths): why is it that at a certain point in time (or most likely different points in time, maybe different places) this became a salient question for humans, so that they deemed it worth their time to investigate it further? Reviel and I share the idea that a major motivation for interest in what we now describe as logic were debating practices in ancient Greece,

which in turn were motivated by developments both in politics and in the sciences. (My Aeon piece argues for this in more detail.[2]) This historicist perspective is still compatible with a realist view of the eternal truths of logic.

Finally, one can simply deny that logic is in the business of describing eternal truths, and that all there is to logic is the development of concepts that respond to various needs that people experience in different situations, but these are concepts that do not latch onto any independent (let alone eternal, necessary) reality. Personally, I prefer to stay agnostic on the ontological status of putative logical truths, especially because, even if they did exist, there is the huge problem of our epistemic access to these facts. (In philosophy of mathematics this is known as the Benacerraf challenge with respect to numbers.) So, either way, I take it that all we really have epistemic access to are the ways in which logic developed overtime in connection with human practices, in the context of human cognitive possibilities. But many philosophers of logic of course disagree with me on this!

Reviel Netz: I have often dabbled myself in this kind of dialectic. It is an intuitively compelling tension to bring up, but it actually kind of crumbles to the touch, as Catarina has already noted. The riddle in fact goes in the other direction. Contrary to the idea that we would have assumed the possibility of objective knowledge, discovered the fact of historicity, and then came to doubt objectivity, we should start by being aware of the fact of historicity and then, once we are equally made aware of the reality that humans have obtained objective knowledge in many diverse fields, this should excite us as a historical and indeed philosophical puzzle. While it is always possible to provide formal epistemological accounts of how knowledge in a rather abstract sense is possible, what such accounts leave unanswered is the question of how, in historical fact, this or that form of knowledge was made possible, at certain times and places. This, for me, is the real task of history for the study of epistemology.

YBC 7289, Babylonian clay tablet, circa 1800-1600 BCE, Yale Babylonian Collection.

GB: With regard to your work, Catarina, it seems that the question of the artifactual nature of logic first concerns the relation between implicit and explicit rules, or between informal practices and their formalization. Here you notably argue that, even if formal 'explicitation' of logical consequence is preceded by a more 'everyday' notion that is implicit in common dialogues, it is not intuitively given to thought but rather a theoretical construct that has a certain historical, and presumably artifactual, development. Contrary to Robert Brandom, for instance, you do not think that the principles of logic pervade ordinary discourse, only to be made explicit by formalization, but that they emerge from rather contrived practices of disputation. In order to avoid supposing a kind of pre-theoretical proto-logical form implicit in thinking, it seems that we must recognize the thoroughgoing artifactuality of all (logical) thought. The historical question then would be to understand how, where, and why, such forms developed at all. How can we explain the progression from pre-theoretical pragmatic behavior to the theoretical construction of implicit notions, and from there to explicit formalizations?

CDN: I do think there is a sort of continuum between more 'mundane' argumentative practices and the more regimented argumentative practices that then give rise to the notion of logical consequence, understood as tightly related to necessary truth preservation. But the fundamental difference is that 'regular' argumentative practices tend to rely on principles of reasoning that are thoroughly defeasible, whereas the notion of logical consequence as understood by philosophers and logicians tends to be indefeasible. The idea is that in most life situations, you may draw inferences on the basis of the information available to you, plus some background assumptions, but these inferences will not be necessarily truth-preserving and monotonic: the available information does not make the conclusion you draw necessary, but rather probable (likely).[3] This means that, at a later stage, new information may come in which will make you withdrawn the conclusion you previously drew, and that is absolutely the rational thing to do! Similarly, in most circumstances the information available to you will not allow for necessary conclusions to be drawn, so your choice is between not drawing any conclusion at all, or drawing the defeasible conclusions that seem likely to you at that point.

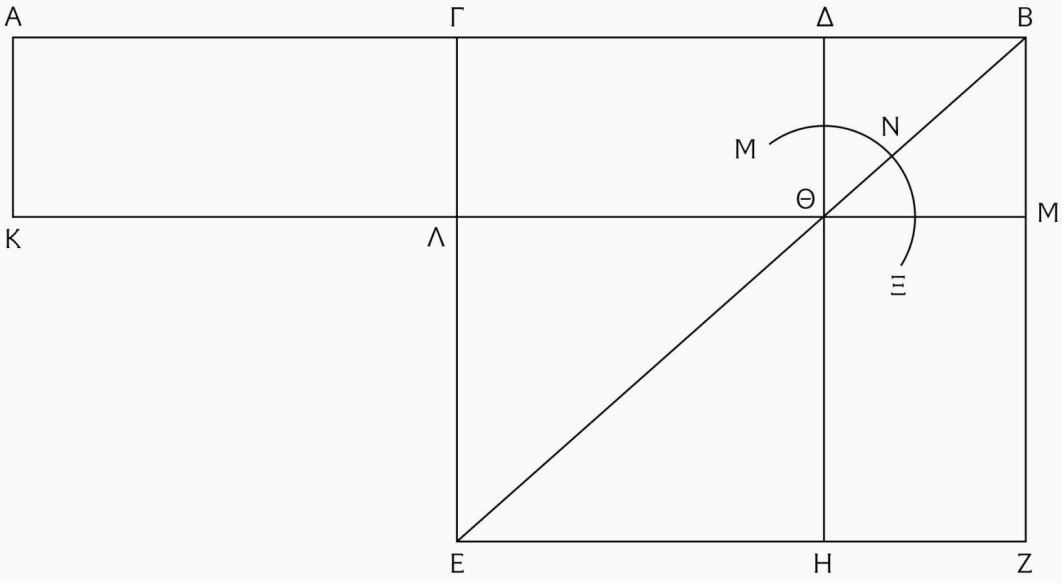
In other words, a defeasible notion of consequence only requires you to look at the most plausible models of the premises you have, and see what holds in them; an indefeasible notion of consequence requires you to look at *all* the models of your premises, not only the more 'normal' ones. This way of conceptualizing the difference was introduced by Yoav Shoham, a computer scientist, under the name of *preferential logics* (which are a family of non-monotonic logics). From this perspective, what needs explaining is, under which circumstances does it become relevant and desirable to take into account *all* situations in which the premises are true, not only the more normal ones? In most real-life contexts, looking at all situations is overkill. So, one way this can be explained is that, in certain debating contexts, arguments that are necessarily truth-preserving are advantageous for the one proposing them, because they are indefeasible: no matter what new information the opponent might bring in, they will not be defeated. (This corresponds to the idea that a deductive argument represents a winning strategy for the person defending it.) This is also how I read Reviel's story on the emergence of deductive argumentation in ancient Greece; a peculiar set of circumstances gave rise to interest in these arguments that are more 'demanding' than defeasible arguments.

Once these contrived debating practices are in place, they can be further regimented and turned into what we usually call *logical systems*. The syllogistic system as presented in the Prior Analytics by Aristotle can be viewed as one of the first occurrences of such a regimentation (see my paper "The Formal and the Formalized"[4]).

GB: Reviel, in your book *The Shaping of Deduction* (1999), you emphasized the crucial role that drawing diagrams, understood as scripto-visual artefacts tapping human cognitive resources through visualization, played in the emergence of a new cognitive ability—namely, the construction of chains of deduction. The difference you seem to posit between these diagrams and other forms of communication such as natural language, points to what may be described as an engine of universality, interlinking highly local/specific practical particularities (specialized techniques in Ancient Greece) and the abstract, global horizon implied by deduction (what you call the shaping of generality). In the history of logic, how did the diagram foster the cognitive ability to navigate these different scales?

RN: I do not have a model where the diagram alone is explanatory. The Greek combination of diagram and formulaic language provides the cognitive tools with which the specific task of producing a Greek-style proof may be obtained. The typical tasks studied by mathematics have shifted historically, and there were also various shifts in media and contexts of use, which allowed the rise of other cognitive tools, of which the most important is visual, 'algebraic' symbolism, which in a sense units the diagram and formulaic language; it is a fantastic tool! It has to be emphasized that we do not have direct access to ancient Greek diagrams; virtually all evidence stems from Medieval manuscripts. This is one reason why past scholars tended to avoid even the question, what were Greek diagrams like. But of course our evidence for antiquity always has to be pieced together indirectly, and I think the same can be done for Greek diagrams. What seems to emerge then is that Greek diagrams were more symbolic and less iconic than we tended to assume for geometrical diagrams. They are ambiguous between icon and symbol. They are not intended to be a picture, through which you can see the object; they are rather understood as a representation of the geometrical relations, through which you can think about the object. This is another reason why they were not studied by past scholars: because the modern assumption that the language/diagrams divide corresponds with a symbol/icon divide made Greek diagrams opaque to modern scholarship. Greek diagrams clarify the identity of the protagonists (these are the points and lines) and their relations (here they intersect, here they contain), but they are not drawn to scale; they use simplified schematic representations (triangles are typically

isosceles, for instance, regardless of which triangle is supposed to be discussed), and they might even represent straight lines by curved, or vice versa, if this helps with the resolution of the picture and so the clarity of the relations. They are thus somewhat 'topological.' All this serves the geometrical argument, as one can rely on diagrams, precisely to the extent that one reads in them this schematic, topological information. Now, as you can see, the shape of Greek geometrical diagrams can be explained functionally: it came out of a need to use diagrams as part of the geometrical reasoning, for which purpose it is better to think of them as symbols more than icons. They did not necessarily emerge in their particular form for this reason. A certain schematic minimalism is simply typical of Greek writing as such; it is the writing of a culture based on performance, where writing is but a secondary tool for the production of performative experiences. And so, their diagrams are schematic, just as their sentences are 'schematic'—lacking, for instance, punctuation or even spacing between words. The topological character of Greek diagrams is an unintended consequence of this minimalism. Another consequence is a certain ontological parsimony. In one sense, the diagram is the object of the discourse. It returns throughout to objects such as "the triangle ABC"—which means the triangle next to whose vertices one can find the letters A, B, C. So, at some level, you discuss a concrete object, right there on the papyrus. But then again, because of the ambiguity between icon and symbol, it never gets clarified quite what this means. Are you talking about some ideal triangle, for which the written diagrams serve as a symbol? Or is it about a look-alike for the figure on the page? This translates into a deeper ontological ambiguity, concerning the nature—physical, or purely geometrical—of the objects studied by Greek geometry.



Euclid's Elements 11.5.

Euclidean lettered diagram redrawn by Reviel Netz, in his book The Shaping of Deduction in Greek Mathematics: A Study in Cognitive History, Cambridge: Cambridge University Press, 1999.

GB: In relation to this, you argue that ancient Greek mathematicians were not so much interested in the ontological status of logic, but rather only in the stabilization and internal coherence of a formal mathematical language. You write that the diagram acted for them as a substitute for ontology; that is, as a means through which they could seal mathematics off from philosophy. For you, the function of the lettered diagram is to 'make-believe,' something that stands between pure literality and pure metaphor. Yet, to make-believe here, is not just performative; it relies on a complex articulation between what you call the shaping of necessity and what you call the shaping of generality. Could you explain this relation between the relative single-mindedness that seems to have determined the way in which ancient Greek mathematicians were able to retreat from any ontological argument, and the way in which the objective truth procedures that they invented and stabilized also had implications that exceeded mathematics?

RN: As a matter of historical, sociological reality, Greek mathematics was shaped with relatively little debt to specific philosophical ideas. Its key practices therefore tend, indeed, to elide specific philosophical questions. How Greek mathematicians ended up this way is a complicated question, but very quickly I can say that they perhaps wished to insulate themselves from a field characterized by radical debate, not because they wished to avoid debate as such but because they wanted to carve out a field of debate of their own professional identity. Then, the rich semiotic tools of Greek mathematics—language

and diagram—allow a certain room for ambiguity concerning the nature of reference, and this is something Greek mathematicians seem to embrace, and I agree with your formulations there. In general, the attitude is one of make-believe. You ask that a circle may be drawn and, with a free-hand shape in place, you proceed as if it were the circle you wished to have there. You mentally enter a universe where everything that can be proved to be doable in principle is, indeed, done in practice, once you wish for it. Indeed, this remains the attitude of mathematics even today, and so we may get too accustomed and desensitized to this attitude. But mathematics is essentially a make-believe game, a practice emerging with the Greek geometrical diagrams: taking an imperfect sign as if it were perfect.

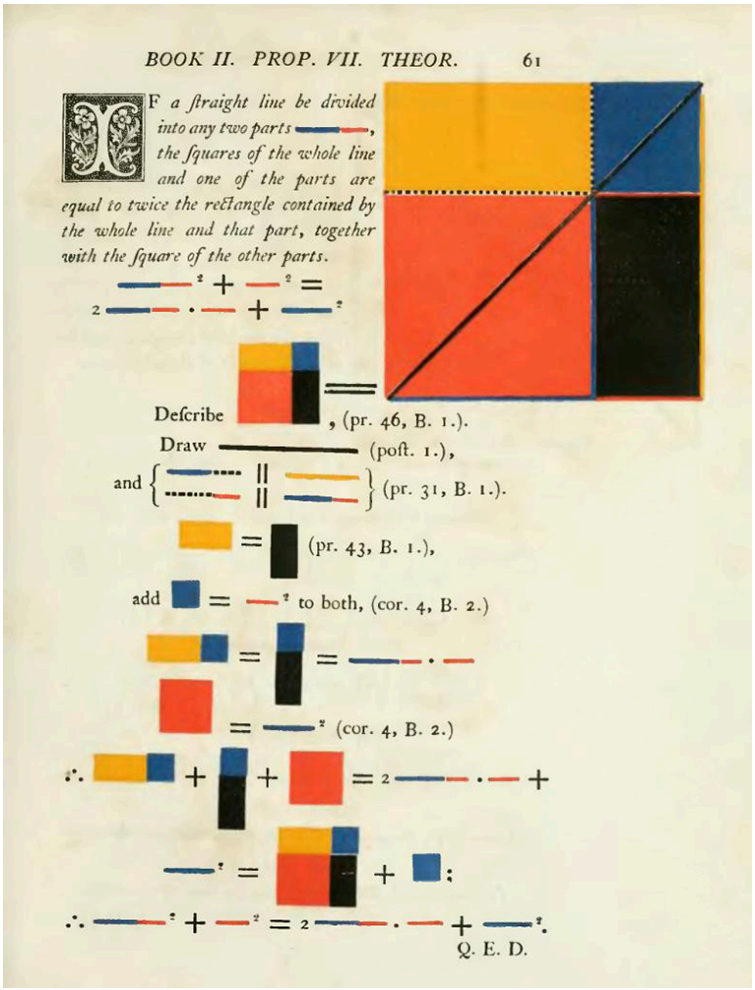
GB: Catarina, in your book on formal languages[5] you understand formalisms as cognitive artifacts that, like the deductive method, allow for a de-biasing effect that counters the pervasive cognitive tendency towards what you call "doxastic conservativeness" (i.e. attachment to prior beliefs). This seems to have important consequences for art. Firstly, at least since modernity, art has been very much engaged with overcoming entrenched beliefs and generating novel conventions, moreover formalized procedures have been integral to this turn. Secondly, it could be argued that (at least non-representative) art is constitutively concerned with what you call de-semantification. It seems that, in this sense, much art could be considered as a kind of *operative writing* (or gesture), as that it is literally a form of thinking that has been externalized onto a particular medium. In the pluralistic conception of human rationality you put forward, how do you view artistic practice within the context of the need to counter doxastic conservativeness?

CDN: Although I have never thought much about the connections between my thoughts on de-semantification and art, I suppose one general connection is that, to some extent, the idea of breaking away from established patterns of thinking by means of cognitive artifacts such as notations is a search for creativity and innovation, in the sense of attaining novel ideas and beliefs. (Yet, of course, my emphasis on *mechanized reasoning* might in fact suggest the exact opposite!) Insofar as art is also tightly connected with novelty and creativity, then there might be interesting connections here worth exploring. But as well described by Sybille Krämer, from whom I take the notion of de-semantification,[6] notations also allow for a more 'democratic' approach to cognitive activity, in the sense that insight and ingenuity is required to a lesser extent. Instead, perhaps in this case the user of formalisms might be compared to the skilled artisan, who can execute beautiful objects by deploying the techniques they are good at, without

necessarily seeking innovation. But again, this is not something I have given much thought to until now, so these are just some incipient remarks. Definitely something to think about in the future.

Incidentally, I have however been working on the question of why mathematicians often talk about mathematical proofs using aesthetic vocabulary, and here some of Reviel's ideas are very interesting. He has this paper[7] where he uses concepts from literary theory like poetry to analyze mathematical proofs, understood as written discourse that is relevantly similar to poems so as to allow for a literary analysis of mathematical proofs also in their aesthetic components. Classical poetry and mathematical proofs have in common the fact that they are forms of discourse constrained by fairly rigid rules, and beauty occurs when creativity and novelty emerge despite, or perhaps because of, these constraints. But maybe Reviel should talk about this, not me.

RN: I would have indeed at least one quick observation to make here. In the paper you mention, I may have in fact over-emphasized the idea of formalism. There's basically no real historical practice of mathematics which is truly formalist. Mathematicians, in historical reality, are almost always engaged with theories that they understand semantically. Because after all this is how you understand and you must operate through your understanding. And the same is true in art. Artists, in historical practice, are people, they tell stories. There are those few aberrant moments in high modernism where this seems to have been avoided but even tonal music is not very far from narrative forms and is in fact embedded, historically, in various forms of song and opera.



Oliver Byrne, The First Six Books of The Elements of Euclid, 1847

GB: The idea that logic has a prescriptive, or normative, import for reasoning—that is, a logically valid argument should compel an agent to act in accordance with the moral law that can be deduced from it—has been heavily criticized within philosophy, and is mostly vehemently rejected within the humanities. Catarina, you agree that the notion of necessary truth preservation that is embedded in many logical systems, in particular the classical framework, is not descriptively valid for reasoning in most everyday situations, and further concede that there are good arguments against considering logic as prescriptive for thought. However, you argue that a historically informed reconceptualization (or rational reconstruction) of the deductive method according to a multi-agent dialogical framework shows that the normativity of logic may be upheld but with significant modifications to the classical image. The normative import of logic for reasoning that results seem to imply a potentially different take on the problem of social relativism. Could you expand on this? The same question could also be asked to you

Reviel, notably in relation to the difference you seem to make in the introduction of your book with what Simon Schaeffer and Steven Shappin have argued in their seminal book, *The Leviathan and the Air-pump* (1985).

CDN: In a weak sense, I am a social constructivist in that I am interested in how deductive practices emerged and developed in specific social contexts. But I do not think that this entails rampant relativism of the kind that is often (correctly or not) associated with the strong program of social constructivism. One way to see this is to think of Carnap's principle of tolerance with respect to logic. Prima facie, he seems to be saying that any set of principles that satisfy very minimal conditions (maybe consistency, or in any case non-triviality) counts as a legitimate logical system. But he also emphasizes that, ultimately, what will decide on the value of a logical system is its applicability. (The pragmatic focus is made clearer in his concept of explication, which I wrote a paper on with Erich Reck.)[8] In turn, what makes it so that some systems will be more useful than others probably depends on a lot of factors: facts about human cognition, facts about the relevant physical reality, facts about social institutions, etc. But it is not the case that any logical system is as good as any other (for specific applications).

As it so happens, deduction is a rather successful way of arguing in certain circumstances, and indeed the Euclidean model of mathematical proofs remained extremely pervasive for millennia. (It was only in the modern period that other, more algebraic modes of arguing in mathematics were developed.) You can still ask yourself what makes deduction so successful and popular for certain applications, despite (or perhaps because) being a cognitive oddity. A lot of my work has focused precisely on addressing this question. But my strategy is usually to look for facts about human practices, and how humans deal with the world and with each other, to address these questions, rather than a top-down, Kantian transcendental approach that seeks to ground the normativity of logic outside of human practices. By the way, just to be clear, I am equally interested in the biologically determined cognitive endowment of humans, presumably shared by all members of the species, and the cultural variations arising in different situations. It is in the essence of human cognition to be extremely plastic, and so within constraints, there is a lot of room for variation.

RN: In fact, I do not think I differ that much from Shaffer and Shapin. I find what they write compelling (and I think they do not disagree too much with me). Yet, it is true that I am, at the end of the day, simply bored by relativism as such. The starting point for my study are the realities: the reality of truth, the reality of history. What I think happens is that many people in the humanities today, who are interested in the reality of history, are

often less interested in the reality of truth (but I do not think this can really be imputed to Shaffer and Shapin). We can analyze the contingent paths that lead there, but that is not the key point right now. The main observation I would add is that if you are less interested in the reality of truth—"Hey, Science and Logic Absolutely Rock! Isn't this Incredible!"—there are certain question you tend to ignore, notably: what-makes-it-possible-for-science-and-logic-to-absolutely-rock. I simply think we should put more effort into this kind of question.

GB: You have both stressed, although in different ways, the differences between everyday forms of communication and the debiasing and generalizing effects afforded by formal languages. In the contemporary context, where artificial intelligence is developing apace, it seems that not only will many intuitive concepts and expert opinions be replaced with automated procedures such as statistical prediction rules, but also the criterion of fruitfulness will for many issues be redefined by AI in ways that we can hardly imagine. In Hegelian terms, Carnapian explication might be seen as historical progression via determinate negation, but here it is an alien intelligence that is tarrying with the negative. How do you think AI will alter the practical and conceptual terrain, and how can we guard against the political inequities of a scientistic subsumption of fruitfulness under exactness?

CDN: I take it that the so-called strong AI program has proven to be unsuccessful, so as a general principle, it seems to me that the most interesting way to move forward with AI is to look for ways in which artificial devices will complement rather than mimic human intelligence. This is very much in the spirit of the *extended cognition* approach that I developed in my 2012 monograph.[9]

There has always been anxiety about the impact of new technologies on human lives—recall Socrates' mistrust of the written language! And yet, it is in the very nature of humans to be "natural born cyborgs," as well described by Andy Clark, constantly in search of new technological developments that significantly impact our lives. It is usually very difficult if not impossible to predict the exact impact that a new technology will have; the thing with technologies is precisely that they are typically developed with certain applications in view, but then often end up having applications that no one could have foreseen. It is probably true that the technology of the digital computer will in the long run have tremendous impact, as is already noticeable, perhaps on a par with the emergence of agriculture, writing, steam engines, the press. What is not true is that this is the very first time that a new, earth-shattering technology emerges which will completely change the way humans live their lives; it is major, but not unique. As for the

political dimension you ask about, here again I think there is nothing intrinsic to any specific technology that will necessarily lead to either inequities or equities; it is all about how it will be used. On the one hand, a focus on automated procedures may free up space and time in human lives to focus on other endeavors once some necessary but tedious ones are taken over by machines (I love dishwashers!), which can positively affect everyone. On the other hand, naturally the mastery of a technology confers power to the ones who master it, which may give rise to asymmetries in power relations. My only point is that this is not new to the latest technology of the digital computer and developments in AI. But time will tell, it may be too early to know at this point. (If anything, the real game changer may have been the development of engines operating on fossil fuel, which may well lead to the destruction of the Earth as we know it, and of human life in the medium run.)

Interview conducted for Glass Bead by Jeremy Lecomte, Vincent Normand and Inigo Wilkins.

Footnotes

1. Danielle Macbeth. "What Is It To Think." *Glass Bead, Site 1: Logic Gate, the Politics of the Artifactual Mind*. November 2017. Web.

2. Catarina Dutilh Novaes. "The Rise and Fall of Logic." *Aeon*. January 2017. Web. Available at https://aeon.co/essays/the-rise-and-fall-and-rise-of-logic

3. See Reza Negarestani. "Three Nightmares of the Inductive Mind." *Glass Bead*'s Research Platform. November 2017. Web.

4. Catarina Dutilh Novaes. "The Formal and the Formalized: The Cases of Syllogistic and Supposition Theory." *Kriterion* 131 (2015). Print.

5. Catarina Dutilh Novaes. *Formal Languages in Logic. A Philosophical and Cognitive Analysis*. Cambridge: Cambridge University Press, 2012. Print.

6. Sybille Krämer. "Writing, Notational Iconicity, Calculus: On Writing as a Cultural Technique." MLN 118 (3), German Issue (2003): 518-537. Print.

7. Reviel Netz. "The Aesthetics of Mathematics: A Study." *Visualization, Explanation and Reasoning Styles in Mathematics* (2005): 251-293. Print.

8. Catarina Dutilh Novaes and Erich Reck. "Carnapian Explication, Formalisms As Cognitive Tools, and the Paradox of Adequate Formalization." *Synthese: An International Journal for Epistemology, Methodology and Philosophy of Science* 194 (1) (2017). Print.

9. Catarina Dutilh Novaes. *Op cit.* 2012.

Catarina Dutilh Novaes is Professor of Theoretical Philosophy at the Faculty of Philosophy of the University of Groningen as well as Editor-in-Chief for the journal *Synthese*.

Reviel Netz is currently a professor of classics and of philosophy at Stanford University.

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A Theory of Vibe

Peli Grietzer

> *Across the foliated space of the twenty-seven equivalents, Faustroll conjured up into the third dimension: From Baudelaire, E. A. Poe's Silence, taking care to retranslate Baudelaire's translation into Greek. From Bergerac, the precious tree into which the nightingale king and his subjects were metamorphosed, in the land of the sun. From Luke, the Calumniator who carried Christ on to a high place. From Bloy, the black pigs of Death, retinue of the Betrothed. From Coleridge, the ancient mariner's crossbow, and the ship's floating skeleton, which, when placed in the skiff, was sieve upon sieve.*
> *—Alfred Jarry, Exploits & opinions of Doctor Faustroll, pataphysician: a neo-scientific novel, 1929*

1. An *autoencoder*[1] is a neural network process tasked with learning from scratch, through a kind of trial and error, how to make facsimiles of worldly things. Let us call a hypothetical, exemplary autoencoder 'Hal.' We call the set of all the inputs we give Hal for reconstruction— let us say many, many image files of human faces, or many, many audio files of jungle sounds, or many, many scans of city maps—Hal's 'training set.' Whenever Hal receives an input media file x, Hal's *feature function* outputs a short list of short numbers, and Hal's *decoder function* tries to recreate media file x based on the feature function's 'summary' of x. Of course, since the variety of possible media files is much wider than the variety of possible short lists of short numbers, something must necessarily get lost in the translation from media file to feature values and back: many possible media files translate into the same short list of short numbers, and yet each

short list of short numbers can only translate back into one media file. Trying to minimize the damage, though, induces Hal to learn—through trial and error—an effective schema or 'mental vocabulary' for its training set, exploiting rich holistic patterns in the data in its summary-and-reconstruction process. Hal's 'summaries' become, in effect, cognitive mapping of its training set, a kind of gestalt fluency that ambiently models it like a niche or a lifeworld.

2. What an autoencoder algorithm learns, instead of making perfect reconstructions, is a system of features that can generate *approximate* reconstruction of the objects of the training set. In fact, the difference between an object in the training set and its reconstruction—mathematically, the trained autoencoder's *reconstruction error* on the object—demonstrates what we might think of, rather literally, as the excess of material reality over the gestalt-systemic logic of autoencoding. We will call the set of all possible inputs for which a given trained autoencoder S has zero reconstruction error, in this spirit, S's 'canon.' The canon, then, is the set of all the objects that a given trained autoencoder—its imaginative powers bounded as they are to the span of just a handful of 'respects of variation,' the dimensions of the features vector—can imagine or conceive of whole, without approximation or simplification. Furthermore, if the autoencoder's training was successful, the objects in the canon collectively exemplify an idealization or simplification of the objects of some worldly domain. Finally, and most strikingly, a trained autoencoder and its canon are effectively mathematically equivalent: not only are they roughly logically equivalent, it is also fast and easy to compute one from the other. In fact, merely autoencoding a small sample from the canon of trained autoencoder S is enough to accurately replicate or model S.

3. Imagine if you will the "hermeneutics of suspicion"[2]—the classical '90s kind of symptomatic or subversive academic reading—was a data-mining process that infers, from what is found and not found in the world constructed by a literary text, an organon (system of thought and feeling) that makes certain real-world phenomena unthinkable, invisible, foreclosed to the order of things. The critic would infer, from observation of the literary work's selection of phenomena, a generative model of the work, finding what is repressed or marginalized in the text within 'gaps' in the generative model: states of the lifeworld that the generative model cannot generate. Pushing the process even further, an ambitious critic would go on to try to characterize *dimensions*—ways in which states of the world can be meaningfully different from each other—missing from the generative model. Contemporary cultural-materialist or ideology-sensitive readings are, as Rita Felksi argues in "After Suspicion,"[3] for the most part "post-suspicion": recent

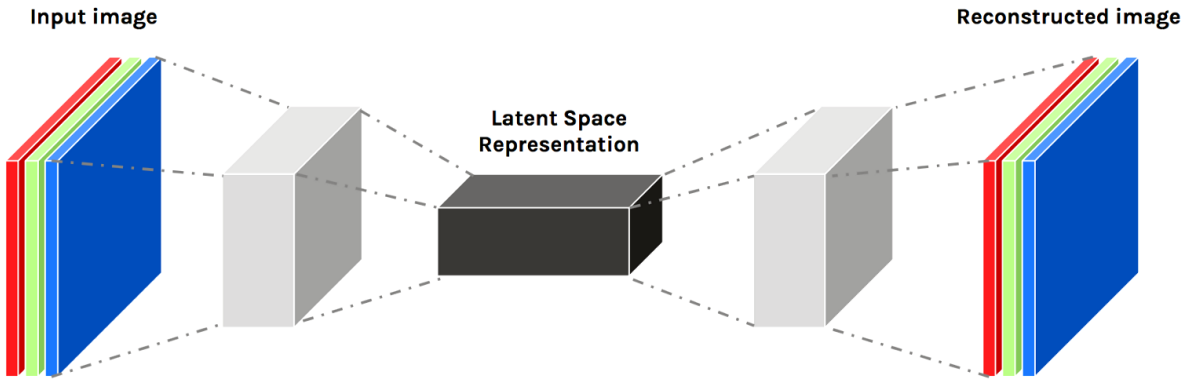
social-theoretic literary critics, especially those associated with the field of affect-studies, tend to differ from their predecessors in assigning reflexivity and agency to literary texts as the facilitators of the critical comparison between model and world. This modern turn places the framework of some recent social-theoretic readers—in particular, Jonathan Flatley and Sianne Ngai[4]—in a close alliance with our own. Specifically, Ngai's landmark argument in *Ugly Feelings* that a work of literature can, through tone, represent a subject's ideology—and so, both represent a structure of her subjectivity and touch upon the structure of the social-material conditions structuring her subjectivity—as strongly concordant with the proposition that systems of 'respects of variation' that we might define by the excess material reality that they marginalize (that is, defined as 'ideology') can be identically defined through the aesthetic unity of material realities they access best (that is, defined as 'tone'). The *canon* of a trained autoencoder, we are proposing, recapitulates the ideology of a system of 'respects of variation' as a tone.

4. Autoencoders, we know, deal entirely in worlds rendered as sets of objects or phenomena. Whatever deeper worldly structures an autoencoder's schema brings to the interpretation of an object, then, these structures are already at play, in some form, in the collective aesthetic of the objects they reign over.[5] I want to think about this aesthetically accessible, surface-accessible, world-making structure as the mathematical substrate of what writer/musician Ezra Koing (via Elif Batuman) describes as "vibe":

> *It was during my research on the workings of charm and pop music that I stumbled on Internet Vibes (internetvibes.blogspot.com/), a blog that Ezra Koenig kept in 2005–6, with the goal of categorising as many "vibes" as possible. A "rain/grey/British vibe," for example, incorporates the walk from a Barbour store (to look at wellington boots) to the Whitney Museum (to look at "some avant-garde shorts by Robert Beavers"), as well as the TV adaptation of Brideshead Revisited, the Scottish electronic duo Boards of Canada, "late 90s Radiohead/global anxiety/airports" and New Jersey. A "vibe" turns out to be something like "local colour," with a historical dimension. What gives a vibe "authenticity" is its ability to evoke—using a small number of disparate elements—a certain time, place and milieu; a certain nexus of historic, geographic and cultural forces.*[6]

The meaning of a literary work like Dante's "Inferno," Beckett's "Waiting for Godot," or Stein's *Tender Buttons*, we would like to say, lies at least partly in an aesthetic 'vibe' or a 'style' that we can sense when we consider all the myriad objects and phenomena that make up the imaginative landscape of the work as a kind of curated set. The meaning of Dante's "Inferno," let us say, lies in part in that certain *je ne sais quoi* that makes every

soul, demon, and machine in Dante's vision of hell a good fit for Dante's vision of hell. Similarly, the meaning of Beckett's "Waiting for Godot" lies partly in what limits our space of thinkable things for Vladimir and Estragon to say and do to a small set of possibilities the play nearly exhausts. Part of the meaning of Stein's *Tender Buttons* lies in the set of (possibly inherently linguistic) 'tender buttons'—conforming objects and phenomena.[7]



Map of a trained autoencoder. All rights reserved.

5. The features or dimensions or 'respects of variation' of a trained autoencoder work very much like a fixed list of predicates with room to write-in for example 'not' or 'somewhat' or 'solidly' or 'extremely' next to each.[8] Within the context of the *feature function*, which produces 'summaries' of the input object, it is most natural to think of the 'respects of variation' as *descriptive* predicates. The features of a trained autoencoder take a rather different meaning if instead we center our thinking around the *decoder function*—the function that turns 'summaries' into reconstructions. From the viewpoint of the decoder function, a given list of feature-values is not a 'summary' that could apply to any number of closely related objects, but rather the (so to speak) DNA of a specific object. A given trained autoencoder's features or 'respects of variation' are, from this

perspective, akin to a list of *imperative* predicates, structural techniques or principles to be applied by the constructor. For the decoder, the 'generative formulae' for objects in a trained autoencoder's canon are lists of activation values that determine how intensely the construction process (the *decoder function*) applies each of the available structural techniques or principles.

6. It is a fundamental property of any trained autoencoder's canon therefore that all the objects in the canon *align with a limited generative vocabulary*. The objects that make up the trained autoencoder's actual worldly domain, by implication, roughly align or *approximately align* with that same limited generative vocabulary. These structural relations of alignment, I propose, are closely tied, and may have a strong relationship to certain concepts of aesthetic unity that commonly imply a unity of generative logic, as in both the intuitive and literary theoretic concepts of a 'style' or 'vibe.' To be a set that aligns with *some* logically possible generative vocabulary is hardly a 'real' structural or aesthetic property, given the infinity of logically possible generative vocabularies. To be a set that aligns with some (logically possible) *limited* generative vocabulary, on the other hand, is a robust intersubjecitve property.

7. By way of a powerful paraphrase, we might say that it means the objects that make up a trained autoencoder's canon are *individually complex but collectively simple*. To better illustrate this concept ('individually complex but collectively simple'), let us make a brief digression and describe a type of mathematical-visual art project, typically associated with late 20th century Hacker culture, known as a '64k Intro.' In the artistic-mathematical subculture known as 'demoscene,' a '64k Intro' is a lush, vast, and nuanced visual world that fits into 64 kilobytes of memory or fewer, less memory by a thousandfold than the standard memory requirements for a lush, robust, and nuanced visual world. In a 64k Intro, a hundred or so lines of code create a sensually complicated universe by, quite literally, using the esoteric affinities of surfaces with primordial Ideas. The code of a 64k Intro uses the smallest possible inventory of initial schemata to generate the most diverse concreta. The information-theoretical magic behind a 64k Intro is that, somewhat like a spatial fugue, these worlds are tapestries of interrelated self-similar patterns. From the topological level (architecture and camera movement) to the molecular level (the polygons and textures from which objects are built), everything in a 64k Intro is born of a 'family resemblance' of forms.

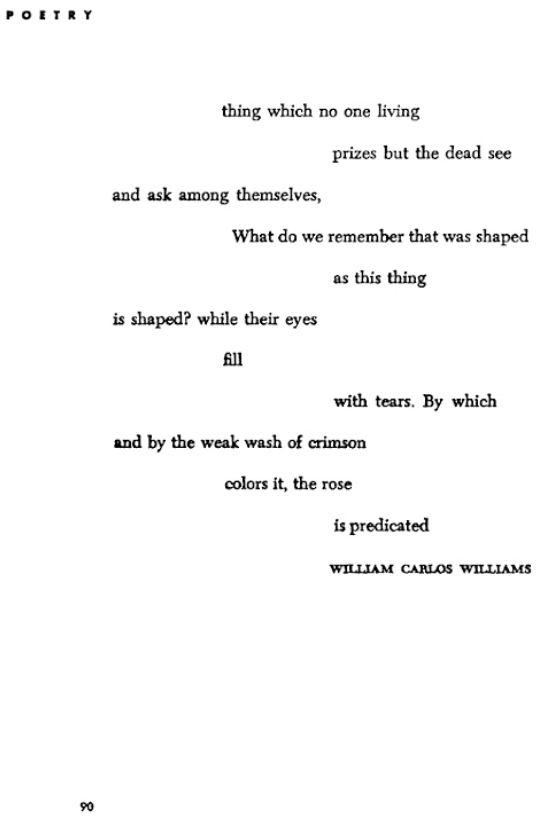
8. Remarkably—and also, perhaps, trivially—the relationship between succinct expressibility and depth of pattern that we see in 64k Intros provably holds for any informational, cognitive, or semiotic system. A deeply conceptually useful, though often

technically unwieldy, measure of 'depth of pattern' used in information theory is 'Kolmogorov complexity': the Kolmogorov complexity of an object is the length of the shortest possible description (in a given semiotic system) that can fully specify it.[9] Lower Kolmogorov complexity generically means stronger pattern. A low Kolmogorov complexity—i.e. short minimum description length—for an object relative to a given semiotic system implies the existence of deep patterns in the object, or a close relationship between the object and the basic concepts of the semiotic system.

9. When all the objects in a given set *C* have low Kolmogorov+ complexity relative to a given semiotic system *S*, we will say the semiotic system *S* is a *schema* for *C*. If *S* is a given trained autoencoder's generative language (formally, *decoder function*), and *C* the canon of this trained autoencoder *C*, for example, then *S* is a schema for *C*. Importantly, any schema S is in itself a semiotic object, and itself has a Kolmogorov complexity relative to our own present semiotic system, and so the 'real'—that is, relative to our own semiotic system—efficacy of *S* as a schema for an object *c* in *C* is measured by the sum of the Kolmogorov+ complexity of *c* relative to *S* and the Kolmogorov complexity of *S*. Because one only needs to learn a language once to use it to create however many sets of sentences one wishes, though, when we consider the efficacy of *S* as a schema for *multiple* objects c_1, c_2, c_3 in *C* we do not repeatedly add the Kolmogorov complexity of *S* to the respective Kolmogorov+ complexities of c_1, c_2, c_3 relative to *S* and sum up, but instead add the Kolmogorov complexity of *S* just once to the sum of the respective Kolmogorov+ complexities of c_1, c_2, c_3 relative to *S*. The canon of a trained autoencoder, we suggested, comprises objects that are individually complex but collectively simple. Another way to say this is that as we consider larger and larger collections of objects from a trained autoencoder's canon *C*, specifying the relevant objects using our own semiotic system, we quickly reach a point whereupon the shortest path to specifying the collected objects is to first establish the trained autoencoder's generative language *S*, then succinctly specify the objects using *S*.

10. Suppose that when a person grasps a style or vibe in a set of worldly phenomena, part of what she grasps can be compared to the formulae of autoencoder trained on this collection. The canon of this abstract trained autoencoder, then, would be an idealization of the worldly set, intensifying the worldly set's own internal logic. Going the other way around, we might consider the idea that when the imaginative landscape of a literary work possesses a strong unity of style, the aesthetic unity of the artifactual collection is potentially an idealization of a looser, weaker aesthetic unity between the objects or phenomena associated with a real-world domain that the work of art encodes.

In the autoencoder case, we know to treat the artifactual collection of objects or phenomena—the trained autoencoder's canon, mathematically equivalent to the trained autoencoder itself—as a systemic, structural gestalt representation of a worldly set whose vibe it idealizes. Applying the same thinking to the literary case, we might speculate that a *dense vibe* in the imaginative landscape associated with a work of art potentially acts as a structural representation of a *loose vibe* of the collective objects and phenomena of a real-world domain. I would offer, similarly, that the 'dense aesthetic structure' in question thus potentially provides a schema for interpreting the objects and phenomena of a real-world domain in accordance with a 'systemic gestalt' given through the imaginative landscape of the literary work.



POETRY

thing which no one living
prizes but the dead see
and ask among themselves,
What do we remember that was shaped
as this thing
is shaped? while their eyes
fill
with tears. By which
and by the weak wash of crimson
colors it, the rose
is predicated

WILLIAM CARLOS WILLIAMS

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Excerpt from William Carlos Williams, Paterson, 1927

11. It is logically possible to share a trained autoencoder's formula directly, by listing the substrate of a neural network bit by bit, but it is a pretty bad idea to try: the computations involved in autoencoding, let alone in any abstractly autoencoding-like

bio-cognitive processes, are mathematically intractable and conceptually oblique. If what a person grasps in grasping the 'aesthetic unity' or vibe of some collection of phenomena is, even in part, that this collection of phenomena can be approximated using a limited generative language, then we cannot hope to express or share what we grasped in its abstract form. One mathematical fact about neural nets that neural-netty creatures like us *can* easily use, however, is the practical identity between a trained autoencoder and its canon: if grasping a loose worldly vibe has the form of a trained autoencoder, we should expect to share our vibe-insight with each other by intersubjectively constructing an appropriate set of idealized phenomena. At the same time, we should expect that the 'idea' that our constructed set of idealized phenomena expresses is essentially impossible to paraphrase or separate from its expressive form, despite its worldly subject matter.

12. A vibe is therefore, in this sense, an *abstractum that cannot be separated from its concreta*. The above phrasing tellingly, if unintentionally, echoes and inverts a certain formula of the "romantic theory of the symbol"—as given, for example, in Goethe's definition of a symbol as "a living and momentary revelation of the inscrutable" in a particular, wherein "the idea remains eternally and infinitely active and inaccessible [wirksam und unerreichbar] in the image, and even if expressed in all languages would still remain inexpressible [selbst in allen Sprachen ausgesprochen, doch unaussprechlich bliebe]."[10] The relationship of our literary-philosophical trope of a 'vibe' to the romantic literary-philosophical trope of 'the Symbol' is even clearer when considering Yeats's more pithy paraphrase a century later, at the end of the romantic symbol's long trans-European journey from very early German romanticism to very late English Symbolism: "A symbol is indeed the only possible expression of some invisible essence, a transparent lamp about a spiritual flame."[11]

13. A question therefore brings itself to mind: does the idea of an abstractum that cannot be separated from its concreta simply reaffirm the Goethe/Yeats theory of the symbol from the opposite direction, positing a type of abstractum (a 'structure of feelings') that can only be expressed in a particular, rather than a type of particular (a 'symbol') that singularly expresses an abstraction? Not really, I would argue; indeed, I would say the difference between the two is key to the elective affinity between vibe and specifically *Modernist* ars poetica.

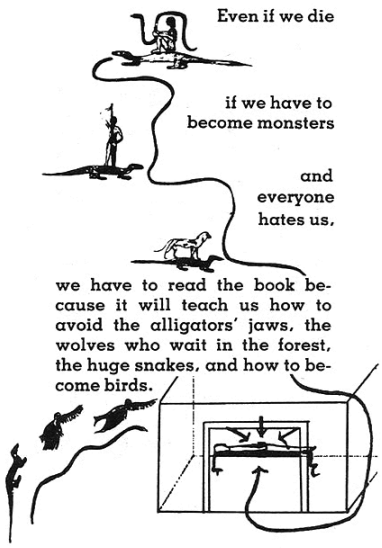
14. Despite its oh so many continuities with Symbolism and romanticism, the era of Pound, Eliot, Joyce, and Stein is marked by the ascendency of a certain *materialist* reorientation of the Symbolist/romantic tradition. One relevant sense of 'materialist' is the sense that Daniel Albright explores in his study of Modernist poetic theory's

borrowings from chemistry and physics, but a broader relevant sense of 'materialist' is closer to 'not-Platonist,'[12] or to 'immanent' in the Deleuzian sense. Recalling Joyce's and Zukofsky's Aristotle fandom, and perhaps observing that William Carlos Williams's "no ideas but in things"[13] is about as close as one can get to 'universalia in re' in English, we might even risk calling it an *Aristotelian* reorientation of the Symbolist tradition, both in aesthetic theory and in aesthetic practice.

15. For the Modernist aesthetic theorist, the philosophical burden on poetics partly shifts from the broadly Platonist burden of explaining how concreta could rise up to reach an otherwise inexpressible abstract idea, to the broadly Aristotelian burden of explaining how a set of concreta is (or can be) an abstract idea. Where Coleridge looked to the Imagination[14] as the faculty that vertically connects the world of things to the world of ideas for example, William Carlos Williams looked to the Imagination as the faculty that horizontally connects *things* to create a *world*. From a broadly Aristotelian point of view, the Poundian/Eliotian —or, less canonically but more accurately, Steinian—operation wherein poetry explicitly arranges or aggregates objects in accordance with new, unfamiliar partitions[15] is precisely what it means to fully and directly represent abstracta: an abstractum *just is* the collective affinity of the objects in a class. In fact, in "New Work for the Theory of Universals," the premier contemporary scholastic materialist David Lewis formally proposes that universals are simply 'natural classes,' metaphysically identical to sets of objects that possess internal structural affinity.

16. By way of an example of a literary work's production of a 'horizontal' *symbol* as described above, we might consider the imaginative landscape of Franz Kafka's corpus. It is not very outrageous, I believe, to offer that it operates as just this kind of aesthetic schema for the unity or the affinity of a collection of real world phenomena. A reader of Kafka learns to see a kind of Kafkaesque aesthetic at play in the experience of going to the bank, in the experience of being broken-up with, in the experience of waking up in a daze, in the experience of being lost in a foreign city, or in the experience of a police interrogation—in part by learning that surprisingly many of the real life nuances of these experiences can be well-approximated in a literary world whose constructs are all fully bound to the aesthetic rules of Kafkaen construction. We learn to grasp a Kafkaesque aesthetic logic in certain worldly phenomena, in other words, partly by learning that the pure Kafkaesque aesthetic logic of Kafka's literary world can generate a surprisingly good likeness of these worldly phenomena.

17. This minor brush with Kafka, and with the inevitable 'Kafkaesque,' also provides us with a good occasion to remark an interesting relationship between ambient meaning, literary polyvalence, and processes of concept-learning. Let us take the late French Symbolist and early Parisian avant-garde concept of 'polyvalence' to include both phenomena of collage, hybridity, and polyphony, where the heterogeneous multiplicity is on the page, and phenomena of indeterminacy, undecidability, and ambiguity where the heterogeneous multiplicity emerges in the readerly process. On the view suggested here, a vibe-coherent polyvalent literary object functions as a nearly-minimal concrete model of the abstract structure shared by the disparate experiences, objects, or phenomena spanned by the polyvalent object, allowing us to unify these various worldly phenomena under a predicate, e.g., the 'Kafkaesque.' The paradigmatic cases of this cognitive work are, inevitably, those that have rendered themselves invisible by their own thoroughness of impact, where the lexicalization of the aesthetically generated concept obscures the aesthetic process that constitutively underlies it: we effortlessly predicate a certain personal or institutional predicament as 'Kafkaesque,' a certain worldly conversation as 'Pinteresque,' a certain worldly puzzle as 'Borgesian.' (I'm still waiting for 'Ackeresque'[16] to make it into circulation and finally name contemporary life, but Athena's owl flies only at dusk and so on.)



Excerpt from Kathy Acker, Blood and Guts in High School, New York, Grove Press, 1984

18. Perhaps the best conceptual bridge from the raw 'aesthetic unity' that we associated with an autoencoder's canon to a kind of systemic gestalt modeling of reality that we associate with the computational form of a trained autoencoder is what we might call the relation of *comparability* between all objects in a trained autoencoder's canon. The global aesthetic unity of the objects in a set fit for autoencoding, I propose, is not just technically but conceptually and phenomenologically inseparable from the global intercomparability of the manifold's objects, and the global intercomparability of the manifold's objects is not just technically but conceptually and phenomenologically inseparable from the representation of a *system*.

19. In the phenomenology of reading, we experience this (so to speak) 'sameness of difference' as primary, and the 'aesthetic unity' of a literary work's imaginative landscape as derived. A literary work's 'style' or 'vibe,' is, at first, an invariant structure of the very transformations and transitions that make up the work's narrative and rhetorical *movement*. As we read Georg Büchner's 'Lenz,' for instance, plot moves, and the lyrical

processes of Lenz's psyche revolve their gears, and Lenz shifts material and social sites, and every change consolidates and clarifies the higher-order constancy of mood. A given literary work's invariant style or vibe, we argued, is the aesthetic correlate of a literary work's internal *space of possibilities*. This space of possibilities is, from the reader's point of view, an extrapolation from the *space of transformations* that encodes the logic of the work's narrative, lyrical, and rhetorical 'difference engine.' Or, more prosaicly: no less than it means a capacity to judge whether a set of objects or phenomena does or does not collectively possess a given style, to grasp a 'style' or 'vibe' should mean a capacity to judge the difference between two (style-conforming) objects in relation to its framework.
20. Learning to sense a system, and learning to sense in relation to a system—learning to see a style, and learning to see in relation to a style—are, autoencoders or no autoencoders, more or less one and the same thing. If the above is right, and an 'aesthetic unity' of the kind associated with a 'style' or 'vibe' is immediately a sensible representation of a logic of difference or change, functional access to the data-analysis capacities of a trained autoencoder's feature function and abstract lower-dimensional representation-space follows, in the *very* long run, even from appropriate 'style perception' or 'vibe perception' alone, since the totality of representation-space distances between input-space points logically fixes the feature function. More practically, access to representation-space difference and even to representation-space distance alone is—if the representation-space is based upon a strong *lossy compression schema* for the domain—practicably sufficient for powerful 'transductive'[17] learning of concrete classification and prediction skills in the domain. When we grasp the loose 'vibe' of a real-life, worldly domain via its idealization as the 'style' or 'vibe' of an ambient literary work, then, we are plausibly doing at least as much 'cognitive mapping' as there is to be found in the distance metric of a strong lossy compression schema.
21. One reason the mathematical-cognitive trope of autoencoding matters, I would argue, is that it describes the bare, first act of treating a collection of objects or phenomena as a set of *states of a system* rather than a bare collection of objects or phenomena—the minimal, ambient systematization that raises *stuff* to the level of *things*, raises *things* to the level of *world*, raises *one-thing-after-another* to the level of *experience*. (And, equally, the minimal, ambient systematization that erases nonconforming *stuff* on the authority of *things*, marginalizes nonconforming *things* to make a world, degenerates experience into false consciousness.)[18]

22. In relating the input-space points of a set's manifold to points in the lower dimensional internal space of the manifold, an autoencoder's model makes the fundamental distinction between phenomena and noumena that turns the input-space points of the manifold into a system's range of visible states rather than a mere arbitrary set of phenomena. The parallel 'aesthetic unity' in a world or in a work of art—what we have called its 'vibe'—is arguably, in this sense, something like a maximally 'virtual' variant of Heideggerian mood ('Stimmung'). If a mood is a 'presumed view of the total picture' (Flatley) that conditions any specific attitude toward any particular thing, the aesthetic unity that associates the collected objects or phenomena of a world or work with a space of possibilities that gives its individual objects or phenomena meaning by relating them to a totality is sensible cognition of (something like) the Stimmung of a system—and much like Stimmung, it is the "precondition for, and medium of"[19] all more specific operations of subjectivity. What an autoencoding gives is something like the system's basic system-hood, its primordial having-a-way-about-it. How it vibes.

Footnotes

1. 'Vanilla' autoencoders, as described here, are antiques in deep learning (DL) research terms. Contemporary variants like autoencoder generative adversarial networks (GANs), however, have performed exceptionally in 2017.

2. The term originally comes from Paul Ricœur, in reference to Marx and Freud. Colloquially, it has come to name the academic reading practices of mainstream Anglo-American critical theory at the turn of the 21st century. See Paul Ricoeur. *Freud and Philosophy. An Essay on Interpretation*. New Haven, CT: Yale University Press, 1977. Print.

3. Rita Felski. "After Suspicion." *Profession*. 2009. 28-25. Print.

4. See Sianne Ngai. *Ugly Feelings*. Cambridge, MA: Harvard University Press, 2007. Print. And Jonathan Flatley. *Affective Mapping*. Cambridge, MA: Harvard University Press, 2008. Print.

5. Compare with Trisha Low: "The idea is that all this ethereal, feminine language is really concrete, or a sort of sublime mass of flesh that can really press down on certain kinds of structures that produced it in the first place. Like tar. Well, I guess I'm not secretly a structuralist anymore because I've said I'm secretly a structuralist so many times that people just know. But I'm interested in the way that somatic disturbances can press up against templates or structures, which make them more visible. Or not even necessarily more visible, but which produce a tension between what you feel is the fleshy part and what you feel is the structure underneath. The two are still indivisible though." (Sarah Gerard. Interview with Trisha Low. *"Trisha Low by Sarah Gerard." BOMB Magazine* 3 June 2014. Web.)

6. Elif Batuman. "What Am I Doing Here." *The Guardian* April 2008. Web.

7. The same goes, I would say, for meaning in the works of Modernists like Alfred Jarry, Virginia

Woolf, Franz Kafka, Maeterlinck, Raymond Roussel, Ezra Pound, TS Eliot, Robert Musil, Anrei Bely, Viktor Shklovsky, Walter Benjamin, Vladimir Khlebnikov, Daniil Kharms, Yukio Mishima, Harold Pinter, John Ashbery, Nathalie Saurraute, Haroldo de Campos, Samuel R. Delany, Kathy Acker, or Robbe-Grillet, and of staple 'proto-Modernist' anchors like Georg Büchner, Herman Melville, Comte de Lautreamont or Emily Dickinson, as well as parts of later Johann Wolfgang von Goethe, Charlotte Brontë, later Anton Chekhov, and later Gustav Flaubert.

8. More formally, we proposed to understand the features of a trained autoencoder as analogous to a fixed list of predicates with room to write-in a real-valued numerical grade from 0 to 9 next to each, where 0 means 'not at all' and 9 means 'extremely.'

9. In the normal definition of Kolmogorov complexity, the 'semiotic system' in question must be Turing-complete: that is, the semiotic system in question must be capable of describing a universal Turing-machine. (Our own 'default' semiotic system—that is, the semiotic system of the human subject currently communicating with you, the reader—is of course Turing-complete, since we can think about, describe, and build universal Turing-machines.) In the coming discussion, we will lift this restriction, in order to allow us to also talk about the Kolmogorov complexity of certain sets relative to more limited semiotic systems—semiotic systems like a given trained autoencoder's 'generative vocabulary' (decoder function). The purpose of this deviation is to save space we would otherwise have to devote to the fidgety technical concepts of conditional Kolmogorov complexity and of upper bounds on Kolmogorov complexity. We take this liberty because unlike most other mathematical concepts, the concept of Kolmogorov complexity does not have a preexisting one-size-fits-all fully formal definition, and always calls for a measure of customization to the purposes of a given discussion. For the sake of propriety, we will mark each instance of this 'off brand' application of the concept of Kolmogorov complexity as 'Kolmogorov+ complexity.'

10. Johann Wolfgang von Goethe. Quoted in Miguel Beistegui. *Aesthetics After Metaphysics: From Mimesis to Metaphor*. New York: Routledge, 2012. Print.

11. W. B. Yeats. "William Blake and His Illustrations to The Divine Comedy." *Ideas of Good and Evil*. 1903.

12. We will leave aside the question whether Plato was, himself, a Platonist in this sense.

13. William Carlos Williams. *Paterson*. 1927.

14. Coleridge and William Carlos Williams both take their concept of Imagination from Kant.

15. A partition is the division of a set into non-overlapping subsets.

16. See Kathy Acker. *Blood and Guts in High School*. New York: Grove Press, 1984. Print.

17. A. Gammerman, V. Vovk, and V. Vapnik. "Learning by Transduction." *UAI'98 Proceedings of the Fourteenth Conference on Uncertainty in Artificial Intelligence*. San Francisco: Morgan Kaufmann Publishers, 1998. 148-155. Print.

18. See Adrian Piper. "Xenophobia and Kantian Rationalism." *Philosophical Forum XXIV* 1-3 (Fall-Spring 1992-93). 188-232. Print. Piper discusses xenophobia as "a special case of a more general cognitive phenomenon, namely the disposition to resist the intrusion of anomalous data of any kind into a conceptual scheme whose internal rational coherence is necessary for preserving a unified and rationally integrated self."

19. See Martin Heidegger. *The Fundamental Concepts of Metaphysics. World, Finitude, Solitude*.

Bloomington: Indiana University Press, 1983. Print.

Peli Grietzer recently finished his PhD in mathematically informed literary theory at Harvard Comparative Literature and the HUJI Einstein Institute of Mathematics. His dissertation borrows mathematical forms from deep learning theory to model the ontology of ‘ambient’ phenomena.

JOURNAL > SITE 1: LOGIC GATE, THE POLITICS OF THE ARTIFACTUAL MIND | 2017

Atmosphere and Architecture in the Distributed Intelligence of Soundsystems: Glass Bead in conversation with Lee Gamble and Dhanveer Singh Brar

Lee Gamble,

Dhanveer Singh Brar

Music is artifactually constructed in the collective interaction of perception with action on material structures; from the instrument to the ear, from the soundsystem to the dancefloor. This psycho-social technical elaboration happens in and across localities with specific histories, social structures, urban architectures and politics. Music can then be thought of as not just capable of expressing and creating atmospheres but as a distributed intelligence that crosses perception, affection, and cognition and engages in their politics. Dhanveer Singh Brar's brilliant account of the ecologies at play in the emergence of Footwork in Chicago inspired us to put him in conversation with Lee Gamble, whose experimental techno is deeply engaged with exploring the ways in which music interfaces with atmosphere, architecture, and intelligence.

Screenshot of the documentary "I'm Tryna Tell Ya" (2014) by Tim & Barry. Source: youtube.

Glass Bead: You are both interested in the psychosocial aspects of music, the ways in which the *nervous system* of the technological infrastructure of music is ramified in the cognitive dimension of the experience of music as well as its social determinations. Dhanveer, you have described Footwork as a mode of redistribution of the logic of the 'grid' (the cartographic organization of the scales of racial difference within the city of Chicago) working through the disruption of its *urban ecology* (the combination of the geography of its built environment, lived experience, and the psycho-social-political determination of its territory).[1] Lee, the conceptual grammar as well as the phonic materiality of your most formalistic, rule-based works are characterized by operations such as sedimentation and construction through decay, and in that, they seem to emulate the prime task of the human auditory system: the organization of perceived frequencies into signifying patterns, making the act of listening similar to the work of a cartographer producing atlases of the auditory scene by working through scales of abstraction and prediction. In both cases it seems you mobilize the aesthetic impact of music and sound as artifactual generators of cognitive and social experimentation, as vectors of production of a *distributed intelligence* (between technician, technology, listener or crowd). In what ways can we understand music in terms of such a socially and artifactually distributed intelligence?

Dhanveer Singh Brar: I do certainly try to think about how music is made and its qualities in terms of what might be termed its 'ecologies,' or perhaps even thinking about music as an atmosphere (as in something which is the result of and generates atmosphere). By using those terms, I am trying to reach for a way of thinking about the innumerable, unstable, generative and potent ways in which some of the music I tend to have a preference for needs to be understood as a kind of socially crafted sonic field, or an atmosphere emerging from the pressures of a specific social environment, and the way technologies are used to modulate that environment into an atmosphere. I guess the most obvious way to think about this is through the continuum of soundsystem culture, both in its Jamaican and diasporic guises. The soundsystem, as far as I understand it, is a kind of feedback device. Musical styles such as rockers, dub, digidub, lovers rock, ragga, jungle, and many more, are not simply 'genres' that 'reflected' a social world existing around soundsystem culture. Instead, these musical styles are more akin to technologies that use the entire soundsystem operation as an instrument that can shape a mood or an environment. What soundsystem culture does, when it is in the process of producing say, a new genre, is take something of the social and physical energy compressed into the populations who gather around it, as well as the immediate physical environment of the city, and maybe even some of what is going on in a given historical moment in time (politically, economically), and transform that accumulated information into a new sonic field. On initial hearing, this new genre sounds kind of alien and weird, but when pumped back into the dancefloor, people respond and the material effect of the sound starts to reorganize desire, which then compels the soundsystem to push that process even further to generate more innovations. Steve Goodman has a much better account of this as "vibe."[2] So too does George Lewis, who calls it "a power stronger than itself."[3] The thing that interests me most, especially in terms of *distributed intelligence*, is that from the late 20th century onwards, the most sophisticated experiments in sonic ecology or atmosphere, of the type I have tried to really poorly describe, in the Global North have been crafted by those who face the full brunt of race, class, and sexual violence. Musical systems such as Chicago House and Jungle have been amongst the most potent instances of distributed intelligence, in my opinion.

Lee Gamble: I think all my music really has something of what you could call an emergence inside. Some of my early computer music work was really concerned with what the computer itself as an object could offer sonically. I was not interested in the computer as a virtual studio, with a conventional musical keyboard attached as it has now become, but more what it sounded like itself, with its limitations and its extensions.

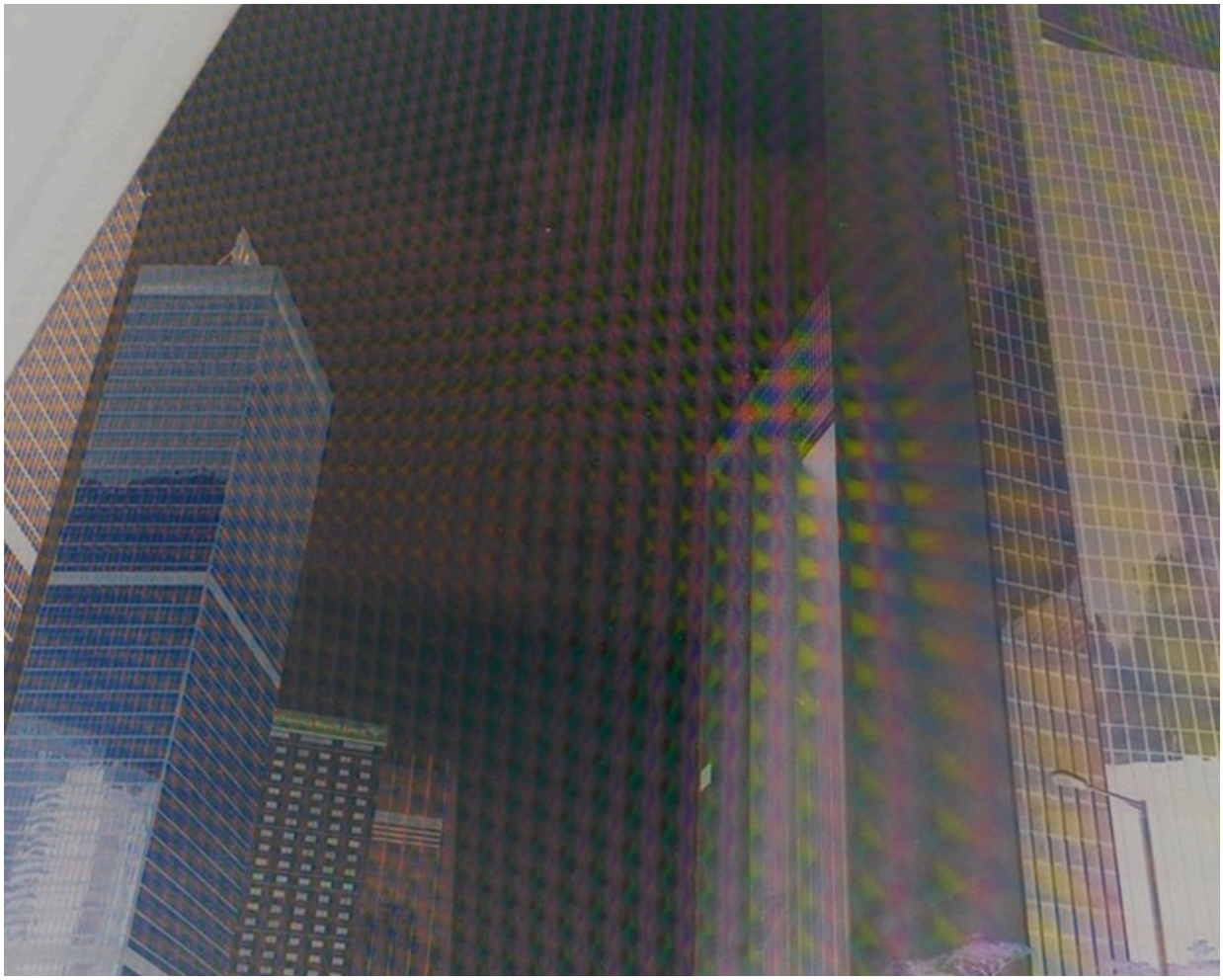
I was strict about particular compositional methods, about not using soft synths. So, mostly I was just running lines of code, recording the result and arranging them on a single stereo channel, trying to kind of get at the bones of the machine, wanting to hear what the computer had to say, as it were.

This became an exercise not necessarily in a musical idea, but more an architectural or sculptural one. The sonic architecture of digital sound is kind of 'infra-microscopic.' The idea of splitting sound became intrinsic, and I often ended up working with these streams of particles—this symmetrical concept of splitting a sound in two, then splitting that sound in two, and so on. Then finding out at which point you do not hear anything anymore. I think this bifurcation point—when sound is inaudible but still divisible—is when sonics reveal themselves as mathematics (again). This feels something like decay as a form of composition. It also felt very digital. The computer allowed this process to go from a materiality (physiological) towards mathematics (abstract), from the physiological constraints of the human auditory system and into to the strange infinity of pure maths. The architecture of data that in reverse results as sound and/or music.

Dhanveer, I read your piece "Architekture and Teklife in the Hyperghetto," and you use the term "phonic materiality" to describe "other forces" inside Footwork. One aspect in all the music I've made is how to kind of get around not knowing music in its notated form, or as an instrumentalist. So, I am always interested to work on other ways to structure sound, and when that happens it feels to me that it opens up lesions in my music that other things (forces) can sit inside and infest; [this] is when I find it most interesting really. So, I really feel connected when you talk about grid systems appearing in Footwork, and how the body's capacities—its limitations and its abilities—find themselves writing patterns into the music in a really direct way. Like, if the body could move even faster, then the bpm would increase, the snare patterns could become increasingly complex. So, what we see and hear with Footwork is an amazing symbiosis of almost the limit of where dance music is at the moment, and that in this form it also relies directly on the body for its sonic design. It is a type of hyper-specific, material system of composition.

And yes, I agree on these hyper-innovative movements in music appearing to emerge from the societal issues you mention. In a way, it is here we find the 'experimental' in music. Where certain other musical forms sit, and appear to stay almost the same (classical music, folk music), electronic music is in constant reinvention under this weird spell that makes it fidgety and elastic and open formed. Of course, it is in part due to technology, but I think they are also born from more broader social systems of organized

innovation too. I am thinking in the UK of the 'Hardcore Continuum,'[4] and the UK as this repository where many influences collide, the geographical position of it (Paul Gilroy's *The Black Atlantic*[5]), its colonial history. The fact that it is an island also geographically gives it this sort of boundary for influences to enter, but then also feed back into themselves, perhaps infinitely. And I think that, yes, there is something to be said to think of this as an idea of not just influence, but of a shared intelligence, dialectics, materialism. A system like this is inherently social; it displays this expansion and contraction, this continuum, and its flux is what drives its emergent properties.



Screenshot of Lee Gamble's "Mnestic Pressure" website (mnesticpressure.leegamble.net), 2017. All rights reserved.

GB: Both of your practices seem intended to navigate a path out of the theoretical caricatures to which music is often reduced. On the one hand, music is often thought in a disembodied sense as this ethereal quality experienced in the mind of the listener, particularly within the classical tradition but also even in popular culture where it is all too often separated from the elements that surround and inform it (race, gender, class,

political economy, drugs, dance, fashion, technology, etc.). On the other hand, music is often just as badly misunderstood when it is conceived in purely bodily terms, as if it had no power to think but only to make bodies move, or when it is thought of as so inseparable from its sociohistorical context as to become a deterministic expression of the epoch. How can we think music beyond these misinterpretations, and understand it as both a form of reasoning and an embodied affective practice?

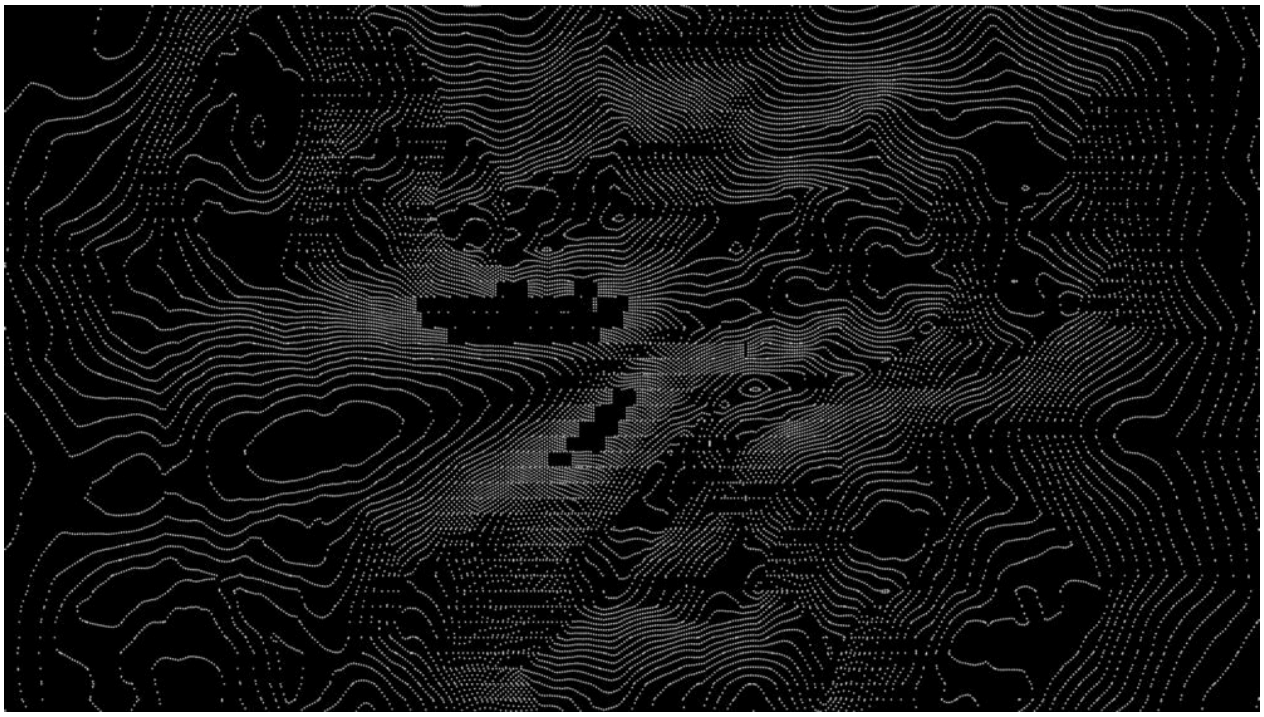
DSB: I think Lee already mapped out something like a response to this question in his previous comment. I was really taken by the way he opened up a way of thinking which is able to encapsulate something which we might call an abstract practice (his work with computers as instruments in and of themselves, or to be more accurate his work at the speculative limits of the computer as an instrument), and the importance he places upon creating lesions in his music which allow for something else to be unleashed through those very carefully crafted techniques he puts together. I think he shows us here already that supposed distinctions between rigorously conceptualized techniques and 'real-world' material forces, do not hold up and should not really be respected when it comes to the constantly inventive production of electronic music.

To speak to the question directly, the way I understand it is that the first tendency speaks to a kind of caricatured high-modernism, and the second tendency describes the often very lazy and dangerous language used to respond to music which are generated by those operating under the greatest racialized/gendered/class pressure. The first move, as I said, is a caricature, or a kind of distorted image of how "serious" music should be consumed and discussed. The second move is often carried out by those who claim to be admirers of the music in question, but are really fetishizing it, and refusing any notion of critical reflection on the part of those who make or dance to it.

I see something like these tendencies converging and animating the way dancefloors operate at present. (I am speaking as punter here, and one who tends to go out in London, so I am sure Lee can correct me on a lot of this with his much wider range of experience). But I think there has been a development whereby, yes, electronic music has been taken seriously as an artistic, intellectual (and in some senses political) project for a number of years now, yet what this seems to have brought in is some of that caricatured high-modernist (or what I call Adorno-bro) tendency. It seems that modes of behavior have begun to shape dancefloors whereby reservation and sobriety have begun to pass for attentiveness to the performance/DJ set. Now, I have no wish at all to police or compel

people's behavior (they can do what the fuck they want as far as I'm concerned—if it bothers me I'll just leave or go dance somewhere else on the floor), but I think there are some troubling logics at work here which I am trying to get my head around.
Let me perhaps try to explain this another way via a story: A few years ago, I was at Notting Hill Carnival and was at the Aba-Shanti sound on their usual spot (the corner of Southern Row and Middle Row in London). The session was fantastic, all that you would expect from Aba at carnival, yet in the middle of the session one of their engineers hauled himself on the top of the huge speaker stack to make some adjustments to the tweeter boxes. He did this because either he, or someone else in the Aba crew, could hear something in the cacophonous intensity of the session that was not quite right, something marginal or minute which required immediate attention. Now clearly, if I had not seen this, I most likely would not have noticed any audible difference to the session, and I imagine most of the people in the crowd did not see it at the time, and so similarly it passed them by too. But yet there was an adjustment made, because someone in the Aba crew felt it was important enough to affect the dance in this way. I was totally fascinated by this, and have not stopped talking about it since!
LG: Interesting, because this is where I think about music in the absolute opposite way to how I was thinking about music in the first answer (systems, concepts) and honestly, not trying to (or at the risk of!) sounding 'new-agey' here, but it has a magic(k) at play in this sense. I really feel this when I'm making an album. I have just been through this process with my new one "Mnestic Pressure."[6] It is this process of having a bunch of ideas, concepts, drawings, notes, thoughts—all really amorphous and disembodied and un-grid-like, scattered—and then somehow forming them into an object. So, it is a gradual movement to and from abstract concepts to physical object to live show, etc.
I am also comfortable here. As much as I like and work with the idea of systems of organization in music (as we talked about before), I have no interest in purely reducing music to scientism. Similarly reducing it to a purely (political?) statement isn't enough either. Sound has this 'magic', this ability to engage itself, to represent itself morphologically, as color, as system, as mathematics, as abstraction, as politics, as change, as a mirror, as time, as a library, as language. It is this malleability that provides it a unique non-place where it travels easily between embodied materialism and vapor.
I am always sat on these junctions, really; I say it all the time in interviews, that I want all these things in my work but really do not expect a listener to have to engage with them all. For me, concept in what I do is not something that I want to add after, to fill out the work. It is the reverse; it is this spell part, the part that is disembodied, that is driving the

whole thing, and 'concept' is made up of all these unconnected parts, these interests. Then there is a morphological process from here to engaging with systems (organization, potential reduction to scientism) and to materialization to object (through labor, engagement with materialism). And that final object contains all these things. Then it is up to the person engaging with it to pull it apart accordingly to their preference (use it in a DJ set, delve into its vapor, just listen as background music).
I guess these are also notions of 'ghosts' inside, like how retroactive interference works on memory and that this physical object (the record) is subdividable: it sort of flips back on itself, then, from container to map to amorphous babble.



Optigram design for Lee Gamble's "Mnestic Pressure", 2017. All rights reserved.

GB: Procedures for automating musical composition have a fairly long history (at least since 18th century Musikalisches Würfelspiel), but algorithmic music is now fairly common, and more recent advances in recurrent neural nets have triggered a surge in AI-based analysis and composition. This often prompts the question of the potential obsoletion of human composers, and (just as chess and now Go have fundamentally changed since Deep Blue and Alpha Go) is mostly answered by rethinking composition as a human-machine collaborative process, though we could say music has always been mediated by technologies (or artifactually constructed). This clearly has political implications even before any supposed 'singularity' point. In an interview in the previous issue of Glass Bead's journal, Mat Dryhurst claimed that "algorithmic music is a

distraction," and that "liveness" is its key feature.[7] What do you think about the impact of AI on music, or more generally the question of the future of music given accelerating technological change?

DSB: I will let Lee deal with AI/algorithmic aspects here, but I have to say, I tend to experience a combination of suspicion and perplexion when asked to consider questions of the future/futurity. This only intensifies when it comes attached to questions about music. My immediate response is: "Well, whose future(s) are we talking about here?" and as part of that, "whose music(s)?". I am happy to admit this may be due to a deficit of imagination on my part, or rather, following Mark Fisher, it might be that my lack of affective response when it comes to the question of the future in music is a product of that very possibility having been destroyed by operations of contemporary capital.

But I would say the following: more than the future, I would rather talk about the way in which music can get involved in the reorganization of desire. That is what I am interested in. And it requires a careful, sensitive, collective work, to not only make music that takes on this task, but to listen once again to some of what has already been produced, or is currently being produced, as a series of innumerable *re-engineering-desire* projects, rather than corral them into a preprogrammed sense of futurity. In the settings I usually move through, I hear such a task being undertaken by the likes of Klein, Dean Blunt, Jlin, and Actress, although I am sure there are plenty of frequencies I am not even tuned into as yet.

LG: Sure. Firstly, I agree with Dhanveer here in his suspicion! Personally, I am confused when it comes to this idea of 'modern' or 'future' or 'present' or 'past' in music. What do those terms even mean? Or more worryingly maybe, what they suggest? Who's 'future' in this case? I have the same confusion relating to 'nostalgia' in the reverse. Like 'who's' or just 'what?' I am just not sure these terms have much use. I am really always interested in the receiver-of-my-work's interpretation anyhow. I am not convinced the artist is entitled to be the judge of what their works mean or where they sit on some timescale of future/past/present for instance. All I feel is that the past and future are contained in the present. Other than that, we dip into really speculative areas, so I think this is best left to personal interpretation. It seems to allow the work to be so much more that way.

Thinking more broadly though, the idea of linear time is problematic. It would presuppose that as we move forward into it, we learn, we leave behind poor ideas and find new and better answers, and that does not universally seem to be the case right now—not just in music, I am talking generally.

I guess art is just a form of re-engineering anyhow, and in part it should strive not to travel on human-centric maps like time. Its function can be to fuck directly with constrained anthropocentric things like these. Also, it does not have to only display human capabilities. An architect developing amazing (and *useful* hopefully!) structures from natural geometric forms is great. I would say that this is more a display of the incredible abilities of the emergent properties of the universe, not of the architect only. He or she is displaying a method of design, a re-engineering of nonhuman geometrics. So, I do not think it is odd that AI outsmarts humans; the world outsmarts humans, cars outpace humans, planes outfly us, spiders make stronger material than us, etc. I think an airplane displays more about physics as a phenomenon of the universe than it does the human. In art though, computational engineering, generative systems, algorithmic music, machine learning, or AI can allow us to move from some human (physical) limitations. I do not think that is a bad thing per se. That can be its function in this context. It is the difference here which is important, too, the ability to think outside of ourselves, to continually move away from anthropocentric models is useful. To be honest, I have not kept fully up to date with what is going on with AI, but instinctively I have this sense that it could be extremely homogenizing, could become a utilitarian commodity sucked up by big corps and sold back at us as 'futuristic,' convenient, new, or whatever. It is not a stretch of the imagination to envisage capitalism taking something as amorphous as the creative output of the human brain, rebranding it, and selling it back to you—AI-generated music becoming a strange ostentatious hyperreal affectation for us to buy! Again, as with anything like this, artists need to have some control of the technology. Inside capitalist markets, the potential for the reduction of technology and ingenuity into a mean average (more sellable) product is always there, and the usual suspects (educated dominant males) will attempt to own this technology. However clever AI becomes, fundamentally it is still going to display and be owned by the 'intelligence' of its researchers and creators, right? So, in representative terms it is limited, and fundamentally in music, its style and intersectionality that make it and us so unique, so that is an aspect of it we could do with holding onto.

Interview conducted for Glass Bead by Vincent Normand and Inigo Wilkins.

Footnotes

1. Dhanveer Sigh Brar. "Architekture and Teklife in the Hyperghetto. The Sonic Ecology of Footwork." *Social Text* 126 (34/1) (March 2016): 21-48. Durham, NC: Duke University Press. Print.

2. Steve Goodman. *Sonic Warfare: Sound, Affect, and the Ecology of Fear.* Cambridge, MA: MIT Press, 2010. Print.

3. George Lewis. *A Power Stronger Than Itself: The AACM and American Experimental Music.* Chicago: University of Chicago Press, 2009. Print.

4. See Simon Reynolds' series of essays exploring musical genres such as Hardcore Rave, Ambient Jungle, Hardstep or Speed Garage. "Simon Reynolds on the Hardcore Continuum." *The Wire* 300 (February 2013). Web.

5. Paul Gilroy. *The Black Atlantic. Modernity and Double Consciousness.* Cambridge, MA: Harvard University Press, 1995. Print.

6. See Lee Gamble. "Mnestic Pressure." (HDBCD037). 20 October 2017. Bandcamp. Web.

7. Mat Dryhurst, Holly Herndon, and Alex Williams. "Re-engineering Hegemony." *Glass Bead. Site 0: Castalia, the Game of Ends and Means* (2016). Web.

Lee Gamble is a British experimental musician and electronic producer.

Dhanveer Singh Brar is a scholar of Black Studies, as it intersects with Cultural Studies and Critical Theory.

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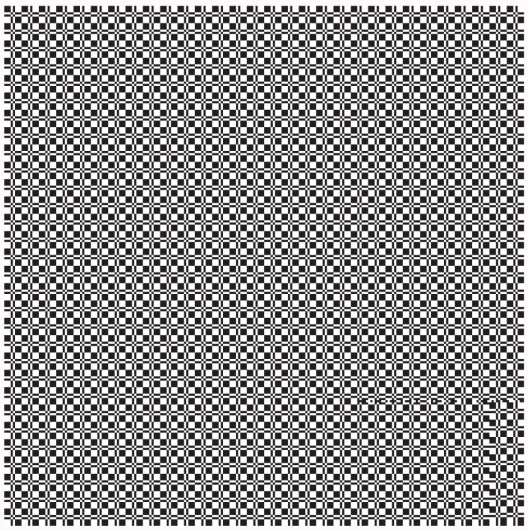
Textile, A Diagonal Abstraction: Glass Bead in conversation with T'ai Smith

T'ai Smith

For decades, textile work barely figured in discussions and studies of modern art because textiles have historically been linked to women's work, domesticity and what could be called a "feminine sensitivity". However, contrary to the traditional image of textiles as rooted in diligent care, intimacy, and intuition, textile practices are logical and iterated operations, structural processes produced through mechanical and engineering decisions, much more than affective expressions of homely pragmatism. Their recognition as an art form only really occurred at the end of the 1990s with the emergence of the network as a major contemporary figure and the increasing attention given to the way in which algorithmic processes shape our contemporary condition, as well as from a revival of interest in craft and design which gave textiles a new significance, releasing them from the margins of modernity. Because of their common genealogies and operations, the interaction between developments in computing and textiles opened new fields of research between textile experimentations and digital technologies. We invited T'ai Smith to discuss how textile practices can both reorient our understanding of the modern project and, as a rule-based art, help provide direction to the artefactual elaboration of its future.



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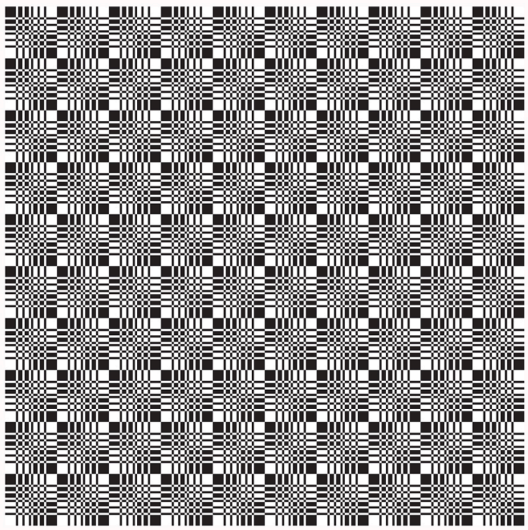

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Glass Bead: In your book *Bauhaus Weaving Theory: From Feminine Craft to Mode of Design* (2014), you investigated the weaving workshop's history, highlighted its central position within the school, and positioned it as a major theoretical engine for the modern project at large. A fundamental shift in textile works of the early 20th century is their progressive uprooting from questions of representation (adequation to references) towards questions of construction (production through inferences). This is a movement that you trace back, in your book, from the early "pictures made of wool" defined by Günta Stölz, one of the leading figures of the workshop, to the invention of a specificity of the medium through the writings of the women of the weaving workshop. Can you tell us more about this shift and how its impact may open to an alternative (or a diagonal) history of art?

T'ai Smith: I would agree with the use of the term 'diagonal.' It goes far to describe the history of 20th-century European textiles—one that doesn't just parallel ("an alternate"), but also cuts across more mainstream histories of modernism in that they occasionally collide, produce sparks, and then part ways. I gather what you might be getting at is the way that the Bauhaus weaving workshop's material and theoretical movement away from pictorial references toward procedural, functional, and material concerns in some sense diverts the trajectory of abstraction that comes through the French and Russian contexts, which is primarily visual-pictorial. What is fascinating about the case of textiles at this particular moment is that the modernist genealogy of form gets complicated. Like many modernists and several of the Bauhaus faculty (I am thinking of Johannes Itten and Paul Klee), the weavers were initially swayed by the colonialist language of primitivism. As much as they were looking at their contemporaries in Europe (cubists, expressionists,

constructivists), they were also examining and appropriating formal patterns and structures from non-European and indigenous cultures. Their exposure to collections of South American textiles at the Ethnological Museum of Berlin meant they acquired an understanding of the more expansive time and geographical reach of their medium. I suspect what they learned from working with threads and looms while looking at ancient blankets was that the history of visual art is spatially and temporally complex—more like the superposition of waves than a single line toward abstraction. Any model of progressive uprooting was also a reverberation of the past. Indeed, a study of the Bauhaus weaving workshop does two things to remap the method of historical analysis. It requires an examination of the ways in which different patterns and concepts—at once modernist, medieval, and ancient, Western and non-Western, discursive and non-discursive—collide through ebbs and flows. In this site, forms, politics, and rhetorical gestures overlap like omnidirectional pulse waves.

To make a more general statement about what this does for a model of art history, it might be instructive to compare this to the way that Mesoamerican art historian George Kubler articulates movement and transformation in *The Shape of Time.*[1] Against teleological and biological models of history, he makes the case that styles and forms produce divergent (and sometimes mutant) signals across space and time, comparable to the travel of light waves from stars, in ways that are not always intelligible. But Kubler's method loses out in its nonconfrontation with discourses and institutions. Kubler's approach accounts for the ways signals generated by visual forms become distorted by a kind of parallax. But these signals are barely mediated, in his account, by textual-linguistic frames. Modern art history is definitely an instance where we cannot avoid the discursive; the rhetoric of the manifesto within avant-garde and abstract art is inseparable from the work. For example, Malevich's *Black Square* is tethered to his textual language of the "zero" of art. Thus, the shift from representation (or "adequation to references") to "construction" is at once a condition of rupture and repetition, modernity and something transhistorical, materially (or ontically) and discursively generated.

GB: One of the central questions of modernity has been the relation between a figure and its ground. This dialectic was constructed throughout modernity through the articulation, distinction or fusion of the figure/motif and its background, but works in textiles have a different logic, operating through a topological perspective that totally transforms the terms and their space of inscription. The weaving gesture produces at the same time the pattern and its canvas. In weaving practices, there are no clear partitions but a new logic of relations: vectors and dynamic polarities. It is also a geometrization of

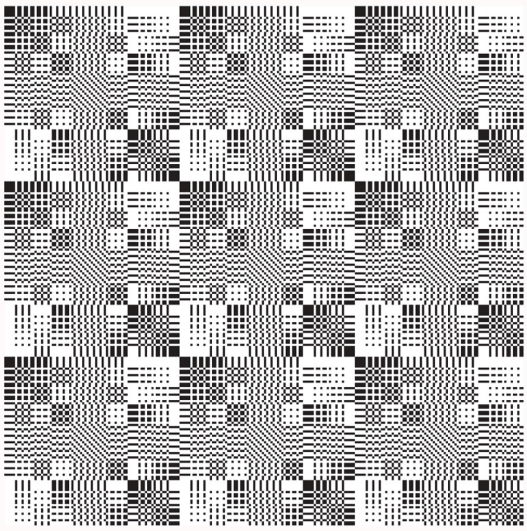
power relations that is at stake here, at all scales—from the very fiber of the threads to the organization of the Bauhaus workshop. The consequences of this textile topology can be very far-reaching for art history.

TS: I am excited to hear you discuss the logic of the physical textile in topological and mathematical terms—"vectors and dynamic polarities"—but also acknowledge that this formal condition played out in the organization of the weaving workshop. When I initially decided to pursue the topic of Bauhaus weaving, I was most of all excited by the overlap of three arenas, which I saw as structurally bound: formal-material or technical questions, questions of collectivity, and questions of gender. First, what textiles offer is a way to open up the space in between two and four dimensions—the thread, the plane, the structure or texture, and the temporality of practice—what I like to think of as the textile's dynamic surface. Weaving yields modernist flatness par excellence and simultaneously makes apparent the structural, material, and historical condition of that topology—all of which is found in the shallow depth of its texture. Textiles exemplify Aloïs Riegl's dialectic of optics and haptics, and in this *opening up* of vision and touch, they also draw attention, as you describe, to the logic of relations of the structural ground. The "*Bild aus Wolle*" ("picture made of wool," or tapestry) is the medial ground and transmitted image or message simultaneously; the structural and conceptual matrix are built through the same material process. (By comparison to the example of light offered by Marshall McLuhan in *Understanding Media*, which he used to literalize his famous dictum, "The medium is the message," the example of tapestry depends on a model of contradictory concurrence, not ontological unity.)

Second, and quite importantly, by focusing on the activities of a workshop, I was able to shift methodologically from a focus on the literal, monographic figure (the modernist artist) to the community of practitioners and the mode of production. Art history of the modern period is very tied to the biographic identification of artists, which is unfortunate, as it leaves so much out of the discussion. Coming at this project through the lessons of Cultural Studies, I was no longer able to abide the monographic model. Indeed, my method was formed out of a political impetus (a feminist and Marxist worldview), but it was also the case that the Bauhaus, by nature of the community and the ideal of (corporate) anonymity, was suspended in the contradiction between *makers making* and *artists being*. When I chose to pursue the topic, I loved that there was no way to avoid the conflicts and collisions between the collective and the individual, and that the dynamics of these tensions were necessarily apparent in the workings of the workshop. For instance, by stressing that the weaving medium had experienced a

particular "feminization" (*Verweiblichung*) within modernity—that this medium, over the course of the long 19th century, turned from a (medieval) craft led by male masters (individuals) to an industrialized practice undertaken by hordes of anonymous, female bodies—I was able to decenter the role of gendered identities (particular "women") and refocus the examination on the history of practices and institutions. By foregrounding the collective ground, I aimed to show how different agencies (specific weavers) came into that space and absorbed collectively generated lessons but also created new dynamics and vectors. In one essay (not in the book), I described this as a gravitational meeting and collision of atoms—riffing off of Jean-Luc Nancy's discussion of the inoperative community as a *clinamen*.[2] The case of the weaving workshop made it especially evident that this site of modernism was a complex network of agencies and discourses. That said, it is important to understand that the parameters and organization of the weaving workshop, however nonhierarchical in practice, were also pushed up against several institutions with their own bureaucracies and logics: Bauhaus governance, State bureaucracy and political parties, the history of gender, etcetera, which were not all homologous to one another, either. The network of the workshop and the school (with its different nodes, vectors, and hinges) was striated by multiple hierarchies and competing protocols that helped mediate how those relations (vectors—not all the same length and not neutral) were navigated and played out.

Indeed, the question of gender and its relation to the institution is paramount. The fact that the medium was gendered 'feminine,' and placed in a hierarchy of mediums, allowed the weavers a certain flexibility. They navigated the power dynamics that circumscribed and penetrated the school by adapting their medium to the language of other media (painting, architecture, photography, patents) and by adapting to transitions among very unstable discourses. The weavers were very strategic and savvy, one might say. Hence, their textile practice was able to sit in the background relatively unnoticed, and this stealthy approach was crucial, I would argue, for the workshop's longevity over the duration of the school's history.



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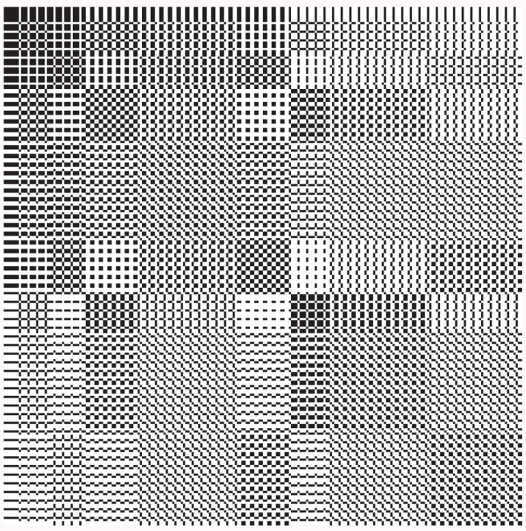

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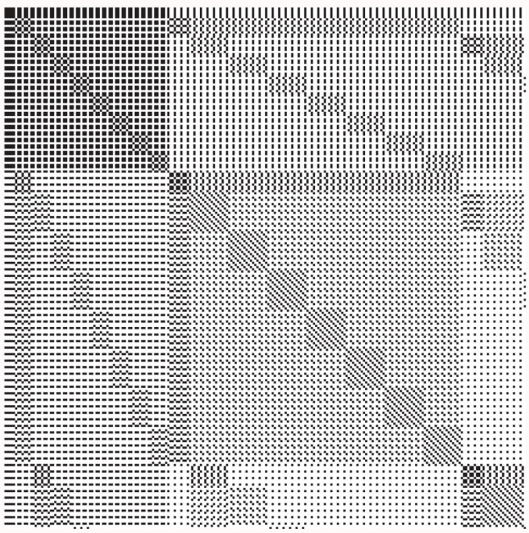
GB: Modern textiles—as you expressed in your book on the Bauhaus, and made explicit above—defined themselves with and against other conventional media such as painting. One of the major differences is that textile is a rule-based art. To create a pattern means to elaborate a set of rules, and a new pattern appears with a change within the rule. Contrary to painting—i.e. traces that you produce on a canvas—a line, in a woven work, is a gradual change of rules. While painting plays with a notion of presence (expression and articulation), textile seems to have more to do with questions of information (compression and convertibility). You are currently working on a new book on diagrams and sewing patterns, and this question of information—under the form of notation (a code)—seems highly relevant for an art that relies on a formal language. How do you see the relationship between patterns and rules in textile work?

TS: Insofar as weaving reproduces a binary logic (the alternate interlacing of warp and weft threads), woven patterns and structures are essentially manipulations of algebraic equations. This was clearly demonstrated by an American weaver and mathematician, Ada Dietz, who exploited this principle in the 1940s and published a short treatise on it in 1949.[3] Dietz basically devised threading patterns based on cubic binomial expansions (interestingly, her ideas for patterns were adapted by a computer scientist, Ralph Griswold for terminal screens in the 1980s). It is not so difficult to imagine, then, that the rule and the change in rule could become a code, a method for communicating through the manipulation and deciphering of slight changes in the pattern.

The textile rule-pattern strangely came to mind recently while visiting the island of Crete, where I had the chance to see ancient Minoan artifacts in the Heraklion Archaeological Museum. Looking at the vitrines filled with pots, architectural models, stone tools, and various impressions of linguistic scripts (but no textiles, which were absent from the display because of material degradation), I had the uncanny feeling that I was looking at the products of Bauhaus workshops: the patterns of lines and waves found painted on pots and cups were repeated across similarly repeated models (even when separated, at times, by one or two thousand years), and they were remarkably consistent, almost like proto-industrial made goods. The patterns were not gestural and uneven (expressive and individual), but rather consistently abstract (in fact, much in the same way that historians have gotten in the habit of describing the intersection of Fordist logic and modernist abstraction). Which is to say that the patterns repeated but also developed with slight changes to the rules. I left wondering, somewhat like Gottfried Semper, whether the rule-based forms of the textile had informed if not the visual style then the *mode* of repetition—the geometric rhythm of the connected spirals and grids that jumped across and linked the otherwise bounded shape of pots or the city plans. Semper argued (while Riegl famously disputed him through his theory of the *Kunstwollen*), that textiles are the Ur-art form, in that they established the model for binding and patterning that would be taken up in other arts, like pottery, metalwork, and architecture.[4] I don't myself believe such a direct explanation of origins, but it is nevertheless striking that textile media rules seem central to the emergence of so-called behavioral modernity—that is, the "suite of behavioral and cognitive traits that distinguishes current Homo sapiens from other anatomically modern humans, hominins, and primates," including the development of organizational systems, rituals, abstract thinking and planning, and the ornamentation of bodies with patterns (like cloth). Of course, all kind of media and tools require repeated gestures; humans are able to communicate and thrive because we repeat the same words, syntaxes, structures, and gestures, and then figure out ways to make slight changes in the rules to create new meaning-forms. Yet, at the same time, the rule-pattern logic (the algorithm) that is *necessary* to follow produce a textile (or a text) is less important to other media. For instance, in pottery, stone carving, or painting, there is more room to depart from shape-defining rules. Though those media often *depict* patterns, they do not, in and of themselves, require adhering to a discrete pattern of practice.



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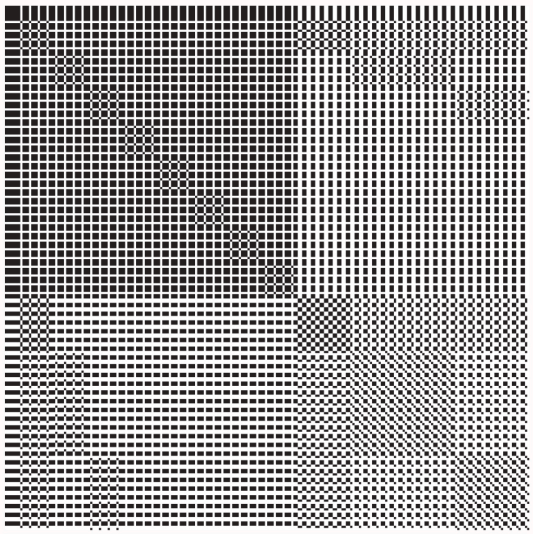

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GB: In this issue of the journal, we are interested in understanding historically the ways in which the artifactual elaboration of mind has been co-opted by dominant forms of labor within the social and technological history of capitalism. Our focus is on the type of traction art can have on it, beyond contemporary art's mere representation of its logic. The critical intervention of the historical avant-garde in the capitalist economy of production of objects can be seen as a critical modelization at the scale of the inner structure of the artwork, decomposing and recomposing it by replacing the terms of commodity fetishism (labor and capital) by semiotic and formal ones (like content and form, or background and figure, the central axes of the modernist reflection on the ontology of the artwork), and where commodity fetishism is critically performed in the form of "exhibition value." What seems very strong in textile practices is that they have not only been a space for modelization but also a space of direct intervention (due to their links to industry) and may allow to rework this modelization. Given the specific technological and political history of textile in art, and its inscription in an often-neglected social history, how do you see textile practices playing in this picture of modernism and the avant-garde?

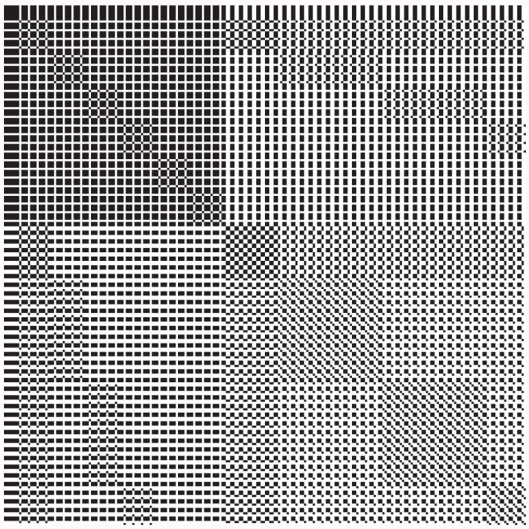
TS: The history of textiles as techniques (or artifactual elaborations of mind) gives us a very clear example of what Marx termed *formal subsumption*, whereby an earlier technique is taken up by and routed through the mode and means of capitalism (first industrial, with the steam-powered loom and cotton mill, and then postindustrial, with things like arduinos and circuit boards). In fact, if I were to rewrite my book now, I might say it was due to the ease of its formal subsumption by capital that textiles were met with

such skepticism and anxiety by expressionist painters who worked under the logic of romanticism. There is nothing essentially critical about the use of textiles or textile forms within art practice. They can occupy different spaces and adapt to new systems' logics: some neoliberal and others more antagonistic to capitalism. Nevertheless, textiles are useful for a practice that seeks to make an intervention insofar as they can 'lay low' in the background (invisible) or emerge in different shapes. As I suggested earlier, there is something stealthy about the textile. Insofar as it can change shapes, use modern or ancient technologies, or adapt to new uses and means, the textile is not restricted by the wall or the square (like painting). It can occupy the realm of functional production (design), it can transmit colonized or obfuscated codes (based in indigenous traditions), it can be frivolous (fashion), or it can encase and soundproof an environment (wall-to-wall carpeting or wall-covering).

GB: It seems there is a trans-quality of textile practices (transcultural, transtemporal, transdisciplinary), as weaving practices are at the same time rooted in traditional forms of labor (manual looms) and cutting-edge industries. If textile has been seen as a domestic work, it is also very much linked to a revolutionary history, from the luddites to the Canuts, and has been part of a larger history of workers struggles. A history of textile can be seen as parallel to another notion which is 'abstraction', both as being part of the history of labor (taking the Marxian and economic sense of abstraction) and that of art. A reworking of textile practices through questions of compression, convertibility, code, relational logic, etc. seems to offer a rational counter-model (as its core material is the matter of reason itself: norms, rules). Can you elaborate on the relations between textile and revolutionary struggles and its relations to abstraction? And could we speculate on another relationship to abstraction through a 'textile history of art'?

TS: Marx's elaboration of economic abstraction vis-à-vis labor, material, and processes was definitely rooted in his observations of textile work and systems. It is especially telling that he provides the classic algebraic formula in the first chapter of *Capital* on the commodity using the example of "20 yards of linen" and "a coat" (*ein Rock*). And when he elaborates his understanding of abstract (or estranged) labor, he describes how the practices weaving (*Weberei*) and sewing (*Schneiderei*) become equivalent through the abstract wage system, whereby time = money. Of course, textile manufacture and machinery were especially central to the history of industrialization. Engels owned a textile factory, and labor movements were initially rooted in the textile sector (from the English Luddites in 1812 to the French Canuts in 1860). These material facts all likely informed Marx's thinking. But it seems to me that the "trans-" quality of textiles (their

simultaneous timelessness and timeliness) may have also been very useful in making his argument about the movement from specific to abstract labor, or from materiality to exchangeability. When he brings in the 20-yards-of-cloth-to-coat formula, it is reasonable to imagine a bolt of cloth actually being turned into a coat—that is, performing a transcoding through a real, material act (cutting and sewing), or migrating "mysteriously" (for the consumer of the commodity) between one form and another.
It really depends on how one defines abstraction (even within Marxian economic analyses there several ways), but many of these pertain to textile forms and processes: mathematization, algorithmic procedures, codes and diagrams (weave drafts), which made textiles especially well-suited to the logic of capital. This understanding of capital-as-abstraction is at root a procedure of simplification and extraction (from materiality). But abstract forms can also hide under the radar of intelligibility; they can be crafty. Abstraction can be either/both politically reactionary and radical, visible and invisible. If nothing else, the history of textiles makes this apparent.
As for speculating on their political efficacy, I would suggest paying attention to the ways that textile codes, procedures, and forms can, in different ways, capture, reveal, and render things communicable; but, at the same time, they can also obfuscate structures and processes or camouflage or cover and hide surfaces. Along these lines, I have always liked Gottfried Semper's very simple (and seemingly contradictory) formulation of textile functions: "The only two objectives of any textile production are: a. the binding / b. the cover. Their formal meaning is universally valid. Contrasts within this meaning (everything enclosing, enveloping, covering appears as a unity, as a collective; everything binding as jointed, as a plurality)."[5] To be able to create a "unity" and "plurality" simultaneously—by both "covering" and "binding"—seems like a great strategy for radical practices.



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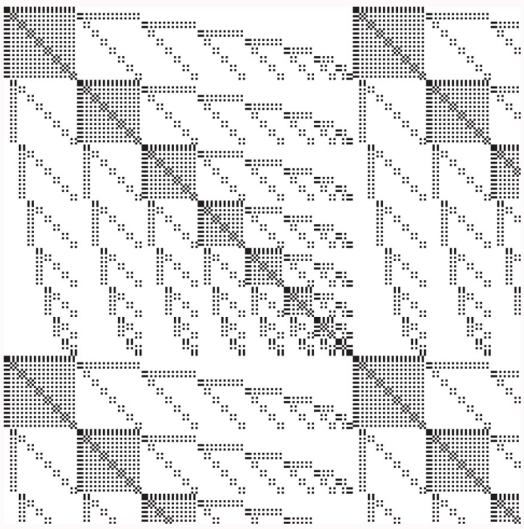

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GB: The metaphor of textile or of a *fibered network* is currently commonly used. If we take back the critical history and capacity of intervention of textiles, could we extend the *textile logic* to contemporary objects and political stakes that have, a priori, nothing to do with woven objects? Having in mind the common genealogy of textile and computation, could the textile logic be a tool to understand the recent developments of AI and computation?

TS: You have cited two different textile logics: the network and the computation. The woven textile, I think, has a more computational logic in that it is binary and algorithmic: its arrangement of warp and weft essentially involves "arithmetical and non-arithmetical steps and follows a well-defined model." The network (or net), by contrast, can be multipronged and multidirectional (with different-scaled vectors) hinged by materially distinct nodes (not fibers); or, it can be made out of a single thread that is knotted to itself. The network is seemingly more suited to thinking about neural activity. The logic of the woven textile, however, may be too rigid, too binaristic. I do not know much about current research in AI, but it strikes me that the flexibility of graph theory might be better suited to the kind of organically-grounded neural pathways that are continuously redefined and rerouted, or which can grow (and die) in multiple directions without affecting the overall structure. That said, Catherine Malabou's work did a lot to convince me that neurons and brains are not so much pliable planes (flexible), or even netlike, as they are *plastic*—continuously able to morph[6] (more than the textile "sieve [tapis] whose mesh will transmute from point to point," which Deleuze cites as a model for the control society.[7]) To imagine that AI could ever approximate this level of plasticity is, no doubt,

part of the task of scientists in that area, but it is also a bit frightening. When we get to that point of biomedia, perhaps the rule-pattern logic of the textile will seem to offer something fresh and radical, something more human.

Interview conducted for Glass Bead by Ida Soulard, Vincent Normand and Fabien Giraud.
All images come from Ada Dietz, *Algebraic Expressions in Handwoven textiles*, 1949

Footnotes

1. George Kubler. *The Shape of Time*. New Haven: Yale University Press, 1962. Print.

2. Jean-Luc Nancy. "The Inoperative Community." *The Inoperative Community.* Ed. Peter Connor. Minneapolis: University of Minnesota Press, 1991. Print.

3. Ada K. Dietz. *Algebraic Expressions in Handwoven Textiles.* Louisville, Kentucky: The Little Loomhouse, 1949. Print.

4. Gottfried Semper. *Style in the Technical and Tectonic Arts; or, Practical Aesthetics, 2 Vols.* (1861/63). Trans. Harry Francis Mallgrave and Michael Robinson. Santa Monica: Getty Research Institute, 2004. Print.

5. Gottfried Semper. "Prospectus: Style in the Technical and Tectonic Arts or Practical Aesthetics" (1859). *Gottfried Semper: The Four Elements of Architecture and Other Writings*. Trans. Harry Francis Mallgrave and Wolfgang Herrmann. Cambridge: Cambridge University Press, 1989. 175. Print.

6. Catherine Malabou. *What Should We Do with Our Brain?* Trans. Sebastian Rand. New York: Fordham University Press, 2008. Print.

7. Gilles Deleuze. "Postscript on the Societies of Control." *October* 59 (Winter 1992): 3-7. Print.

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Re-engineering Commonsense

James Trafford

1. Commonsense, power, and hegemony

Accounting for *commonsense* is somewhat tricky since its sedimentation and construction occurs at the level, not of discursive rules, but of assumptions, habits, and dispositions. But, since this social background of norms shapes the meanings within which our lives are formed, it is also the central site in which our local interactions and contexts are tied to broader structures, practices, and sanctions. Collins, for example, argues that a "system of commonsense ideas" operates to structure and provide meaningful background to social processes in favor of those who are privileged from the point of view of social power.[1] If, with Sewell, we accept that social structures are recursive, then whilst commonsense structures often *look* to be entrenched, natural, and objective, they result from a matrix of processes and power relationships that require ongoing maintenance through material and normative force.[2] In Collins' example:

> *Whether the inner-city public schools that many Black girls attend, the low-paid jobs in the rapidly growing service sector that young Black women are increasingly forced to take, the culture of the social welfare bureaucracy that makes Black mothers and children wait for hours, or the "mummified" work assigned to Black women professionals, the goal is the same—creating quiet, orderly, docile, and disciplined populations of Black women.*[3]

There is a nexus here, involving the construction of commonsense as a domain of power, which is also involved in recursive feedback loops across organizational structures, material and economic constraints, and in complex and multiple ways. Considering such examples requires understanding past actions of governance (both local and national), mediatization, cultural norms, economic and housing deprivation of inner-city, and so on. Some of these structural processes are reinforced by legal systems, whilst some are reinforced almost by *habit*, but it is the confluence of these processes that, understood as normatively structuring the contours of people's lives, may be understood as fields of power that both constrain and enable behavior.[4] Our everyday practices are continually involved in the production and reproduction of those structures, and in acting according to accepted norms of the communities in which we live we reinforce processes that contribute to the existing landscape of power.[5]

By approaching these structures through the notion of commonsense, we can foreground a number of interrelated issues regarding the role of rendering such commonsense explicit, particularly given a philosophical and political tendency to either deride or hypostatize commonsense. According to advocates of deliberative democracy such as Habermas, for example, the legitimacy of political decisions requires that they are the "outcome of deliberation about ends among free, equal, and rational agents".[6] Resultantly, any failure of deliberation to achieve democratic consensus is put down to failed communication, rather than having to do with incommensurable differences. Errors of reasoning are put down to the distortion of communication with each other, and the inability to adhere to normative criteria that would enable rational agreement.[7] So, for example, in Bohman's attempt to deal with these issues, he argues that deliberations may go awry when ideologies interfere with the participants involved.[8] Such ideologies may, for example, cohere with current hegemonic interests, thus going uncriticized whilst also containing bias and misunderstanding. Legitimacy for political decisions, then, would require us to render ideology explicit as "false" belief, to be released from it. However, Habermasian deliberation requires us to already be free from such ideology, whilst also providing no traction upon how we may free ourselves from it.[9]

The above picture of the relationship between commonsense and social structures complicates this further. Commonsense is not the sort of thing that can be discursively elaborated, being composed of dispositions that are open-ended, differential responses to each other and to contexts, emotions, and embodied actions. Its polyvocality deflects criticism, which has led many to foreground the situated and specific "here and now" as

an unanalyzable foundation of *practices*, as in Rorty's ethnocentrism.[10] But, the imbrication of power and commonsense renders this problematically conservative where "meanings are so embedded that representational and institutionalized power is invisible".[11] Such "hegemony colonizes consciousness",[12] so foreclosing our ability to reconstruct, or renegotiate, commonsense, particularly insofar as hegemony is understood to embed a specific constellation of power across the social field. But, how, then, could it be possible to begin "crafting counter-hegemonic knowledge that fosters changed consciousness",[13] when agents find themselves to be embedded in, *and to further embed*, forms of power that disenable them from exactly that? Neither discursive explicitation and reasoning, nor understanding commonsense as an unanalyzable set of practices, would seem to do the job. So, what sort of capacities would be required to craft counter-hegemonic strategies?

Prince-electors in deliberation, Codex Balduineum, Mid-1300s.

2. Reasoning as interactional practice

Let us consider how norms are instituted to better understand the construction of commonsense. Perhaps the best-known account of commonsense is in Wittgenstein's notion of *forms of life*, which is often used as a means of considering practices of living together, our ethical commitments to each other, and the basis of our language games.[14] According to Wittgenstein, in order for agreement in opinions (his terminology), we first require that there exists a "common form of life" in which we are "mutually attuned" with each other—which, as Mouffe points out, does not require procedural rules.[15] Such forms of life have often been understood as an unanalyzable set of practices, which absolves from responsibility any judgments made on that basis.[16] Others, however, have used the notion to demonstrate that *regulism* (the idea that norms can be grounded in explicit rules) yields to a vicious regress. Famously, Wittgenstein argues that the regress shows "that there is a way of grasping a rule which is *not* an *interpretation*, but which is exhibited in what we call 'obeying the rule' and 'going against it' in actual cases".[17] More recently, Brandom interprets Wittgenstein's conclusion as motivating a pragmatic approach to rules: "[T]here is a need for a pragmatist conception of norms—a notion of primitive correctnesses of performance implicit in practice that precede and are presupposed by their explicit formulation in rules and principles".[18] Brandom's solution to the regress of explicit rules is to look for rules that are *implicit* in our practices. For Brandom, norms of reasoning are "instituted" through social practices in which certain rules of reasoning that are implicit in those practices may be made explicit through their public expression in language games. Brandom argues not just against regulism, but also against *regularism*, which in this case would say that implicit rules could simply be *read-off* from regularities in practice. One problem with regularism is that we could force a finite set of practices to conform to several distinct rules, and for any "deviant" form of practice, it can be made to cohere with some rule or other. As such, any attempt to distinguish between correct and incorrect practices would seem to quickly break down, and the idea that we could *read off* a set of rules from practice would seem to end-up with our *writing-away* all those occasions in which we do not reason according to the norms that are supposedly implicit in our behavior. Brandom attempts to deal with this sort of problem by arguing that social norms can be identified by the way we *sanction* each other in ordinary linguistic practice, by judging each other's utterances to be correct or incorrect. But, as Brandom notes, sanctioning cannot itself be a matter of regularity, or disposition, since that would simply reintroduce the problem of regularist gerrymandering at the level of sanctions,

rather than the level of first-order practices. As such, according to Brandom, sanctions must themselves be normative, so we have "norms all the way down".[19] That is, Brandom effectively *postulates* the existence of proprieties of practice as normatively primitive, and argues that these determine our abilities to evaluate and sanction each other. Thus, whether or not this avoids the problems of regulism and regularism, is now reliant upon giving a decent account of this activity of sanctioning that is thoroughly intersubjective. According to Brandom, what is required to *say* something, rather than merely *do* something, is for an agent to both be able to have the algorithmic ability to elaborate practices to employ a vocabulary *and* to have "scorekeeping" abilities, where agents keep track of each other's commitments and entitlements, where commitments are sentences to which an agent is committed (though perhaps unknowingly as consequence of other commitments), and entitlements are sentences to which an agent is justified after having defended them successfully.[20] In the latter, however, we are being asked to think of norms not as emerging from reciprocal interrelations and interactions between agents, but through a kind of checking-mechanism in the form of a detached observer. It is at this level of the community of scorekeepers that meanings are determined, and also norms instituted. As Habermas points out, on Brandom's view, the assessment of utterances is made, not by "an addressee who is expected to give the speaker an answer",[21] rather a community plays an authoritative role in considering what our utterances mean, and also which reasons are taken to be correct or incorrect: "what is correct is determined according to what the community of those who have command of the language hold to be correct".[22] Sanctioning practices are, therefore, inextricably related to the social attitudes defined on the basis of membership in a specific community, where membership in a community may also be understood to be normatively defined by means of those practices. This is both worryingly conservative, and asymmetric from the point of view of agents' ability to disagree and dissent from communal practices and sanctions. Indeed, if we say that meaning is determined by a set of specific inferences, and that those inferences must be at least substantially similar in order for communication to be possible, then not only would agents dissenting from some of those inferences not be able to communicate about the same thing, they may be accused of not even deploying the same concepts.[23]

So, Brandom fails to provide an account of intersubjective norms, and, in the process illuminates the inherent conservatism of social norms insofar as their construction is obfuscated. There is reason to think, however, that the coordination of linguistic interaction exists as a kind of shared understanding between agents without requiring

objective scaffolding, or implicit rules.[24] In distinction with dominant analytical philosophy of language, linguistic interaction may be understood in terms of non-intentional coordination and underlying cooperative activities. For example, Gregoromichelaki and Kempson provide evidence and argument to the effect that communication does not require the manipulation of propositional intentions, since agents often express "incomplete" thoughts without planning or aim regarding what they intend to *say*, "expecting feedback to fully ground the significance of their utterance, to fully specify their intentions".[25] Moreover, this kind of coordination between agents is often sub-personal, involving mechanisms by which agents *synchronize* together prior to the level of communicative intention. In making utterances in interaction, we may "start off without fixed intentions, contribute without completing any fixed propositional content, and rely on others to complete the initiated structure, and so on".[26] As such, it is argued that *meaning* should be understood by means of intentionally underspecified—yet incrementally goal-directed—dialogue.

By thinking of interaction as a form of action coordination, it is possible to see how our dispositions to make assessments of each other's actions may refer *to each other*, and are therefore also involved in the reinforcing and construction of meaningful dialogue. This can be understood in terms of our practical attitudes, which are just dispositions of differential response and interaction with certain patterns of stimuli, where these are typically low-level mechanistic processes that require neither implicit rule-like norms, nor explicit rationalization.[27] So, for example, our linguistic expressions, which are mutually and incrementally forged into meaningful statements through our ongoing conversations, are subject to feedback mechanisms determining appropriateness of response at a sub-intentional level. It is through the interaction of our practical attitudes with each other in continuous feedback and adjustment that normative assessments become themselves instituted and also implicated within those very mechanisms. Our linguistic dispositions (and broader embodied practices), therefore signal and shape the appropriateness of each other's responses, and so our talk *about* meaning, or *about* the norms shaping our interaction, may also be understood to exhibit dispositions that become implicated in the feedback mechanism insofar as it affects those meanings or norms. Norms, therefore, become sedimented through our interactions, and the cases in which explicit normative talk is required to keep our interactions coherent with each other are decreased over time by the convergence of our practices. As Kiesselbach puts it, this gives us a way of understanding "normative talk as essentially calibrational".[28]

It is, moreover, through understanding the interactional nature of dialogue and the institution of norms as consisting of primarily *sub-intentional* processes, that we can understand the role that our embodied actions, feelings, and habits play in the coordination and socialization of our dispositions. In other words, norms are just the regularities produced by adjustment and correcting mechanisms of feedback internal to interactions with each other, where these lead to the reinforcing of stabilities in those interactions, and their recognition as being appropriate or inappropriate. Interactions give rise to norms when the relevant interactional activities reinforce certain patterns of behavior as acceptable, or unacceptable, in social practices through recursively acting upon those underlying patterns. This can be understood in terms of recursive feedback loops that are generated through the interactions between patterns of behavior, and so are apiece with the mechanisms that also generate patterns of behavior, through mechanisms of differential response. As such, behavior that can be understood in terms of norms is the same-in-kind with pattern-governed behavior. In many ways, this is similar to the account given by Sellars, though the distinction made there is between pattern-governed behavior and rule-governed behavior, whereas the structure of norms here is not characterizable in terms of a system of rules, particularly since it is primarily concerned with lower-level, and often sub-sentential mechanisms.[29] Still, the potential for algorithmic decomposability of such mechanisms into patterns of activity, where that activity is understood in terms of interactive and auto-reinforcing dispositions, allows for an account of the *explanation* of the intersubjective basis of norms without thereby eliminating, or reducing, them in the process.[30]

Rather than think about norms in terms of rules against which our practices can be judged, perhaps we should consider there to be a plurality of practices, of forms of interaction, and of distinct contexts, in which the norms of our language are felt, reinforced, and revised. In most communication, there is a continuous adjustment of phonological, gestural, lexical, and grammatical features.[31] These primary feedback and adjustment mechanisms shape the forms that norms will take, and are already shaped by the structure of our relationships. Normative statements are then employed as part of mechanisms to repair conversations and to sanction certain practices, where the practices of repair and sanctioning are also implicated in feedback mechanisms that further embed those norms in our practical attitudes.[32] If the processes and mechanisms of coordination and feedback go on smoothly, such normative language is not required to keep the interaction going. The use of normative vocabulary, then, would seem to come into play when agents are required to conceptualize interactional performances in

which there is a need to engage in explicit deliberation, or to repair a conversation using explicit sanctions.[33] This means that extricating *rationality* from social norms in this context is both impossible, and wrongheaded.[34]

Screenshot of FKA twigs's "How's That" (2013), video by Jesse Kanda. All rights reserved.

3. Re-engineering commonsense

We now have a decent account of the construction of intersubjective norms, such that it underwrites the account of commonsense discussed above. Moreover, this normative space is clearly distinct from both a "masking" ideology *and* a set of unanalyzable practices. Furthermore, the above allows us to understand how intersubjective norms become sedimented in a relational field that is sculpted by power. This does not require communal stability to underwrite communication, rather, feedback and adjustment institutes and sediments norms across intersecting linguistic interactions without clear-cut boundaries. As such, we can understand the practices of interaction to inculcate norms, not through a process of explicitation, nor by explicit communal sanctioning, but often through the conglomerate pressure of a wider communal practice against the potential validation of divergent practices. Norms thereby generatively constrain and enable, and are therefore consistent with Foucault's later analysis of power as "a mode of action which does not act directly and immediately on others," which "consists in

guiding the possibility of conduct."[35] In other words, power can be understood as a "system of differentiations" and a "system of differentials," in which "a whole field of responses, reactions, results, and possible inventions may open up."[36] This "field" is constituted of "channels," such that the possibility for action and interaction are shaped, not through a system of causal determination, but through the sculpting of the landscape, or complex structures, in which we are situated.[37] So, the structure of norms, and the ways in which they become sedimented with relative stability through these mechanisms may be understood to be shaped by power where divergence of practice from that normative structure is subject to sanctions to "bring it back in line." These dispositions, are, moreover, "looped-in" to material processes and social structures and institutions, so further embedding this field of power, stabilizing norms, and making certain claims and reasons more difficult to accept or deny.[38]

Norms, therefore, emerge from, yet also exert significant pressure on, social and material structures. The conservative nature of normative practice is endemic to Brandom's approach. Here, however, whilst our ability to diverge from accepted usage comes with a cost, the process of explicitly reasoning and considering our norms and the way in which they are sculpted is made possible by the fact that there are no precise normative rules (implicit or explicit) to which we may appeal to adjudicate those activities in the first place. Furthermore, whilst Brandom's account relies upon communal stability and the normative constraints of group membership in which a system of norms becomes visible to that community, this approach suggests that it is not possible for a group to become explicitly aware of a system of norms that is being reinforced across that community. Indeed, by embedding the account in a radical intersubjectivity, we need not rely upon a notion of a stable "community," preferring instead to think of *relatively stable* norms, across which there are multiple and intersecting relationships and interactions. As such, the "harmonious" nature of much linguistic interaction may be understood to be an effect of the sedimentation of norms through the sanctioning of linguistic practice, and, therefore, of the embedding of specific forms of structural power.

In these settings, whilst it is certainly the case that there are relative points of equilibrium maintained through reinforcement and feedback through adjustment, calibration, and sanctioning (where required), even the activity of sanctioning would give rise to the possibility of *resculpting* local norms by explicitly reconstructing those norms in our interactions. This is because, unlike the effectively third-person standpoint of sanctioning practices required by Brandom, for us, the practice of sanctioning is "brought into the loop," so the sanctioning agent is equally implicated in their own

practice of sanctioning. In this way, rather than understand sanctioning as simply reinforcing equilibrium, we may rather think of sanctioning as making available normative-talk for the reconstruction of differential patterns of linguistic activity. Since these activities cannot be forestalled by a precise set of rules (implicit or explicit), the interactions always have potential to construct new forms of activity that begin to construct new *norms* of practice. But note that this is neither a matter of ideology critique, nor of making explicit, since reasons, here, are emergent from interactions, rather than constitutive of speech-acts in the sense understood by Brandom. That is, reasons should not be thought of as driving communication, but rather as "discursive constructs," which allow for explicit deliberation, particularly when the coordination of underlying dialogue breaks down.[39] So, interactions are the foundation through which reasons may be constructed *a posteriori*, since we cannot determine in advance of the interaction, either what counts as a reason, or the meaning of expressions involved. On this, radically interactional, approach, we think of the construction of reasons over the course of a linguistic interaction through the coordinated relationship between agents who are directly involved in that interaction. All reasons, in this sense, are "joint reasons" in that they are the result of a process of joint articulation that is not reducible to, nor derivable from, facts about the individuals involved in the interaction.[40] Moreover, the norms structuring our reasoning together, and through which the meaning of terms is constructed, are always possibly modifiable, and indeed are constantly modified simply by the practices of interaction.

What is currently commonsense is a functional, usually invisible, means by which the "naturalization of the present"[41] masks the ability to consider the social world beyond its current stratification. But, no structure of norms, nor the system of power in which they are embedded, is determined. Systems of commonsense are never static, rather they require constant reinforcing and reforging, and so there are dynamic tendencies for their modification in every situation, however sealed-off they appear. The conglomeration of these tendencies form resources that may be deployed to construct new forms of commonsense. The above account provides us a means to understand the way in which such commonsense is constructed through complex and intersecting material processes, whilst also having the capacity to re-engineer those very processes.[42] We can engage this *capacity* to re-engineer commonsense, therefore, as a *collective* endeavor in which the current landscape of norms and power is shifted and oriented towards constructing alternative structures in which structural injustices are recalibrated, and the asymmetry of social resources redistributed. This, as is clear, requires us also to pay attention to the

strategic reconstruction of our institutions and material processes to better scaffold and stabilize new norms, and practices, across our interactions. Since our dispositions are not determined by rules, but rather are tendencies that are shaped under social pressures, it is possible to reshape these so to build new forms of commonsense, and new visions of a world to become "naturalized".[43] What this means, in practice, is that by actively renegotiating sanctions, and so modifying the norms of our interactions, it is possible to also reform the landscape of power. This is to understand such practices in attempt to reconfigure structural power as a *practice of freedom*, *within*, rather than *from*, power.[44]

The author wishes to thank Alex Williams and Inigo Wilkins for their insightful comments on a previous draft of this paper.

Footnotes

1. P.H. Collins. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment. Perspectives on Gender*. Taylor & Francis, 2002. 284. Web. See the discussion of the construction of commonsense in the work of Gramsci in Alexander Williams. "Complexity & Hegemony: Technical Politics in an Age of Uncertainty" (thesis). London: University of East London, 2015. Web.

2. William H. Sewell, Jr. "A Theory of Structure: Duality, Agency, and Transformation." *American Journal of Sociology* (1992): 1-29. Print.

3. Collins. *Op cit*. 281.

4. For an account of social structure conducive to this discussion, see Dave Elder-Vass. *The Causal Power of Social Structures: Emergence, Structure and Agency.* Cambridge: Cambridge University Press, 2010. Print.

5. See Iris Marion Young. *Responsibility for Justice*. Oxford: Oxford University Press, 2013. Print. The analysis of "internalization" captures this to some degree, though it suggests a "one-way" imposition of power and ideology, which the account here attempts to complexify.

6. J. Elster. *Deliberative Democracy (Cambridge Studies in the Theory of Democracy)*. Cambridge: Cambridge University Press, 1998. 5. Print.

7. This is central to Habermas' early work, e.g. Jürgen Habermas. *The Theory of Communicative Action, Vol. 1: Reason and the Rationalization of Society*. Trans. T. McCarthy. Beacon Press, 1984. Print.

8. James Bohman. *Public Deliberation: Pluralism, Complexity, and Democracy*. MIT Press, 2000. Print.

9. Tully makes a similar point in *Public Philosophy in a New Key, Vol. 1*. Cambridge: Cambridge University Press, 2008. Print.

10. For Richard Rorty, ethnocentrism is the suggestion that there is an acculturated historical communal word view around which we have consilience in a specific community, and beyond

which there is little sense in asking for justification of that world view, e.g. in "Solidarity or Objectivity." *Post-Analytic Philosophy* 3 (1985): 5-6. Print.

11. Susan S. Silbey. "Ideology, Power, and Justice." *Justice and Power in Sociolegal Studies*. Eds. Bryant G. Garth and Austin Sarat. Evanston, IL: Northwestern University Press / The American Bar Foundation, 1998. 276. Print.

12. *Ibid*. 289.

13. Collins. *Op cit*. 285.

14. Ludwig Wittgenstein. *Philosophical Investigations*. 4th ed. Trans. Hacker and Schulte. Wiley-Blackwell, 2009. Print.

15. Chantal Mouffe. *The Democratic Paradox*. London: Verso, 2000. Print.

16. See the discussion in Linda Zerilli. *Feminism and the Abyss of Freedom*. Chicago: University of Chicago Press, 2005. Print.

17. Wittgenstein. *Op cit*. 201.

18. Robert Brandom. *Making It Explicit: Reasoning, Representing, and Discursive Commitment*. Cambridge, MA: Harvard University Press, 1994. 44. Print.

19. *Ibid*. 44.

20. Robert Brandom. *Between Saying and Doing: Towards an Analytic Pragmatism*. Oxford: Oxford University Press, 2008. Print.

21. Jürgen Habermas. "From Kant to Hegel: On Robert Brandom's Pragmatic Philosophy of Language." European Journal of Philosophy 8-3 (2000): 322–355. 345. Print.

22. *Ibid*. 336.

23. A similar point is made in Timothy Williamson. *The Philosophy of Philosophy*. Malden, MA: Blackwell, 2007. Print.

24. The account here effectively takes the interactional dynamics of syntax detailed above to embellish and expand upon the cybernetic, calibrational, and action-coordination, additions to Brandom's account discussed in Austin Hill and Jonathan Rubin. "The Genealogy of Normativity." Pli: *Warwick Journal of Philosophy* 11 (2001): 122-70. Print; Matthias Kiesselbach. "Constructing Commitment: Brandom's Pragmatist Take on Rule-Following." *Philosophical Investigations* 35-2 (2012): 101-26. Print; Kevin Scharp. "Communication and Content: Circumstances and Consequences of the Habermas-Brandom Debate." International Journal of Philosophical Studies 11-1 (2001): 43-61. Print, respectively, and developed in full in James Trafford. *Reason and Power: Reforging the Social World*. Forthcoming.

25. Eleni Gregoromichelaki and Ruth Kempson. "Grammars as Processes for Interactive Language Use: Incrementality and the Emergence of Joint Intentionality." *Perspectives on Linguistic Pragmatics*. Springer Press, 2013. 185-216. Print. This view coheres with "interactivism," "enactivism," and "interaction theory," in which cognitive activity (including the construction of meaning) is inextricable from an agents' environment, both social and physical, e.g. Shaun Gallagher and Katsunori Miyahara. "Neo-Pragmatism and Enactive Intentionality." *New Directions in Philosophy and Cognitive Science: Adaptation and Cephalic Expression*. Ed. Jay Schulkin. Palgrave Macmillan, 2012. Print.

26. Gregoromichelaki et. al. *Op cit*. 209. Pezzulo discusses (often sub-personal) "coordination tools" which explain the ease by which interactions occur. Giovanni Pezzulo. "Shared Representations as Coordination Tools for Interaction." *Review of Philosophy and Psychology* 2-2 (2011): 303-333. Print.

27. See Simon Garrod and Anthony Anderson. "Saying What You Mean in Dialogue: A Study in Conceptual and Semantic Co-Ordination." *Cognition* 27-2 (1987): 181-218. Print.

28. Kiesselbach. *Op. cit*.123.

29. Wilfrid Sellars. "Some Reflections on Language Games". *Philosophy of Science* 21-3 (1954): 204-28. Print.

30. For an attempt to formally account for some of these dynamics, see James Trafford. *Meaning in Dialogue: An Interactive Approach to Logic and Reasoning*. Springer Press, 2016. Print.

31. Herbert H. Clark. *Using Language*. Cambridge: Cambridge University Press, 1996. Print.

32. See, for example, the analysis of power and control in conversational repair as including mechanisms of silencing, interruption, control of access to common ground, in Emanuel A. Schegloff, Gail Jefferson, and Harvey Sacks. "The Preference for Self-Correction in the Organization of Repair in Conversation." *Language* (1997): 361-382. Print.

33. See Gregoromichelaki et al. *Op. cit*. 2013 for a similar analysis of group tasks.

34. Attempts to extricate rational norms rely upon an individualist account of reason in which our reasoning can be judged by external standards in a social vacuum, which is argued against in detail in Brandom. *Op cit*. 1994; Anthony Simon Laden. *Reasoning: A Social Picture*. Oxford: Oxford University Press, 2012. Print.

35. Michel Foucault. "The Subject and Power." *Critical Inquiry* 8-4 (1982): 777-795. Print.

36. *Ibid*.

37. Hall similarly suggests that "hegemony is always the temporary mastery of a particular theater of struggle. It marks a shift in the dispositions of contending forces in a field of struggle and the articulation of that field into a tendency." S. Hall, D. Hobson, A. Lowe, and P. Willis. *Culture, Media, Language: Working Papers in Cultural Studies, 1972-79*. Taylor & Francis, 2003. 36. Print.

38. See Ian Hacking. *The Social Construction of What?* Cambridge, MA: Harvard University Press, 1999. Print.

39. Eleni Gregoromichelaki, Ronnie Cann, and Ruth Kempson. "On Co-Ordination in Dialogue: Sub-Sentential Talk and Its Implications." *Brevity*. Ed. Laurence Goldstein. Oxford: Oxford University Press, 2013. 53-73. Print.

40. See the discussion of "we-reasons" in Laden. *Op cit*. 2012.

41. Anthony Giddens. *Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis*. Berkeley, CA: University of California Press, 1979. 195. Print.

42. The term re-engineering is drawn from Wimsatt, who defines it as the process of "...taking, modifying, and reassessing what is at hand, and employing it in new contexts, thus *re*-engineering. *Re*-engineering is cumulative and is what makes our cumulative cultures possible." William Wimsatt. *Re-Engineering Philosophy for Limited Beings: Piecewise Approximations to Reality*. Cambridge, MA: Harvard University Press, 2007. 6. Print.

43. Whilst much has been said regarding the political impotence of artistic practice, and its complicity with financialisation (though see the discussion in Robin Mackay, Luke Pendrell, and James Trafford. *Speculative Aesthetics*. Falmouth: Urbanomic, 2014. Print.), it should be clear that art, understood in the context of this process of re-engineering is capable of a torsion in which the politics of appearance is shown to be inextricable from its underlying structural reconfiguration. Such appearances may thereby be unhinged from their natural status without invoking voluntarism, and their inevitability unbound from within the same structural processes of power in which the artist is implicated.

44. Foucault. *Op. cit.* 786-7. When habitually sedimented norms begin to shift, these may be experienced as abrasive "triggers" from the point of view of those who are positionally privileged by those norms. People may claim that certain interactions are *unreasonable*, whilst those interactions are directed at shifting structural norms such that social positions and actions may be transformed to attend to structural imbalances of power. It is precisely in these moments of problematic interruption to harmonious interaction that it becomes possible to orient ourselves towards the contingency of our local meanings, so making visible our latent parochialisms and "reasonable" biases. For analysis of this in terms of "white fragility." See Robin DiAngelo. "White Fragility." *The International Journal of Critical Pedagogy* 3-3 (2011). Print.

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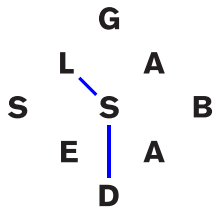


JOURNAL > SITE 2. DARK ROOM: SOMATIC REASON AND SYNTHETIC EROS | 2019

Site 2. Dark Room: Somatic Reason and Synthetic Eros

Glass Bead

G*lass Bead*'s journal began by exploring Castalia, the equivocal utopia Herman Hesse imagined in *The Glass Bead Game* (1943).[1] In Hesse's weird fiction, Castalia is projected as the apex of transdisciplinarity, a highly aestheticized and ludic vision of knowledge in and for itself, an institution where a select number of men devote their lives to the advancement of knowledge in all domains, ascetically secluded from the turmoil of concrete existence and utterly removed from its own political implications. In our first issue, we mobilized Castalia as a particularly apposite site for addressing the catastrophic predicament of contemporary art understood as an indeterminate negation of knowledge and power: its bankruptcy in the face of neoliberal capital, its ineffectuality as a generalized critique, its empty posturing of radicality, its washed-out irony, and its exceptionality from reason and purpose. As such, *Glass Bead*'s journal set about attempting to morph the image of Castalia, arguing that it was necessary to reconceive transdisciplinary reason, in order to rethink the relation that art entertains with philosophy, science, and politics. In the second issue, we pursued this effort to transform the classical image of reason by focusing on computational culture and the computational account of cognition, with a particular emphasis on logic as a critical vector for engaging the project of artifactually elaborating freedom. In both cases we rejected the customary depiction of philosophical and scientific rationality as disembodied contemplation and detached observation. Nevertheless, as we directed our gaze on the conditions of knowledge, the body and its politics receded into the distance.

In this issue, we resolved to turn back to the concrete conditions of embodied thought. From the assessment of historical attempts at grounding critique in the body, to the exploration of contemporary issues surrounding situated knowledge; from the analysis of the aesthetic and political economy at play in the encounter with advanced human-like sex robotics, to that of the ways in which algorithms are transforming our sense of intimate relationships; and from reflections on the ways in which cruising practices subvert dominant discourses on architecture and the city, to the analysis of the sexual economy at work in specific art forms: the contributions gathered in this issue navigate the fault line at the juncture between erotics and rationality. The contention here is that contemporary upheavals concerning love, sex, and reproduction are not mere side issues that can be safely dealt with in various already-existing discursive regimes (e.g., biology, psychology, identity politics), but crucial transformative vectors for developing a renewed understanding of transdisciplinary reason.

Dark Room

Produced in the framework of Okayama Art Summit 2019 ("lF THE SNAKE," curated by Pierre Huyghe, September 27 – November 24, 2019, Japan), the framing of this issue was partly inspired by a striking piece taken from the history of Japanese cinema: Kazuo Hara's *Kyokushiteki Erosu Koiuta 1974* (*Extreme Private Eros: Love Song 1974*) (1974). Depicting both a candid and violent love triangle, this film is first and foremost the portrait of a radical feminist (the filmmaker's ex-wife Miyuki Takeda) who defiantly transgresses the normative constraints of Japanese society by striking out on her own as a single mother; affirming her homosexuality and arguing openly with her new lover; giving birth, completely unassisted, on camera and in full view, to the illegitimate daughter of an African-American GI; crusading in Okinawa's nightclubs in order to berate men in general and American soldiers in particular; and unapologetically emasculating Hara to his new partner, sound recordist and producer Sachiko Kobayashi.

Still from Kazuo Hara's *Kyokushiteki Erosu Koiuta 1974* (*Extreme Private Eros: Love Song 1974*), 1974.

Extreme Private Eros is significant because it operates a reversal of the cinematic gaze that has now become prevalent in social media life, but that, at the time of its making, was truly revolutionary. Implicated in the events of the film as its object rather than its mere representing subject, Hara's camera's 'open-air' depiction of intimacy is simultaneously the sign of what could be now seen as an all-revealing, male, normative gaze, and the concrete axis of its subversion. By relentlessly tracking Takeda's body while ceaselessly producing equivocations in the relationship the camera entertains with it, Hara allows the film to become for the viewer an experiment in subjection and objectification, as well as in subjectification and objection. Doing so, *Extreme Private Eros* aligns the 'dark room' to which intimacy has been confined and that the film breaks open with the 'dark room' of the recording apparatus, thus putting them in multi-stable variation.

In the framework of this issue, taking the 'dark room' as a site has several meanings. Most literally, it refers to two places defined by their function. Firstly, the dark room is the name given to an architectural feature of certain gay cruising areas, a heterotopic

place unexposed to public scrutiny where normative expectations are different, where private desires are freely exposed, and where bodies expect to unexpectedly meet. Secondly, as alluded to earlier, it is also the place where photographic images are produced, which is indissociable from the machinic realization of the voyeur, the capture of the body on film, its exposure, development, and publication. In a psychological sense, the dark room has also been thought of as a site of reproduction or incubation: while Sigmund Freud considered the womb to be the quintessential dark room, his Hungarian colleague Sandor Ferenczi took this argument further by understanding the sea, taken as a site of primal gestation, as the original dark room. In this metaphorical sense, the dark room can be thought of as the 'black box' par excellence, a zone of epistemic obscurity, whose deeply sedimented operations are hidden from our understanding. Ultimately, the dark room represents what is disguised and unsaid, unconsciously repressed and deliberately concealed: the obscure or obscured architecture of desire and sexuality.

Germ Cell

Researchers estimate today that over 99.9% of eukaryotes do reproduce sexually. From bacteria to most higher primates, sex tends to be coextensive with reproduction. This, we are repeatedly told, constitutes the backdrop against which humans appear an exception, for human sexuality is singularly not restricted to its reproductive function (although it is attested that such socialized sexuality is shared by at least two other species, bonobos and dolphins). The problem of what led early humans to move from the socialization of sexual interactions to their normative regulation by types and tokens remains a highly debated topic[2], but what is certain is that if human sexuality is haunted by the articulation between sexual intercourse and fertilization, the reasons are not merely biological but social-historical. In most cases, the constantly reestablished bond between sex and reproduction is not limited to the problem of passing on genes to the next generation, but loaded with various territorial, economic, ideological, social, and cultural functions. The violence exerted upon and against what are considered deviant sexual practices is in fact most often motivated by a conservative upholding of this bond: from homosexuality to asexuality and transgenderism (a term precisely not used by transgender and queer activists for its pathological connotations), the very definition of sexual deviance or abnormality nearly always rests on its divorce from reproduction.

Terracotta votive offering in the shape of placenta, Rome (Italy), 6th-1st century BC. Science Museum, London.

In 1970, American radical feminist Shulamith Firestone advocated that a truly feminist revolution could only come together with the advent of artificial forms of reproduction, freeing women from the burden of pregnancy. Considering that "the heart of woman's oppression is her childbearing and childrearing roles,"[3] she called for technological developments that would not simply suppress natural reproduction, but question what is deemed natural in a context where feminism, she contended, could only be aligned to "a revolutionary ecological program that would attempt to establish a *humane* artificial (man-made) balance in place of the natural one."[4] She further argued that "artificial reproduction is not inherently dehumanizing. At [the] very least, development of an option should make possible an honest reexamination of the ancient value of motherhood."[5] Although Firestone was lucid enough to say that to envision artificial reproduction and birth control in the cybernetic hands of the present powers was to envision a nightmare, she argued that this situation should not prevent us from speculating and working towards an ecological and feminist revolution that could imply a "qualitative change in humanity's basic relationships to both its production and its reproduction."[6]

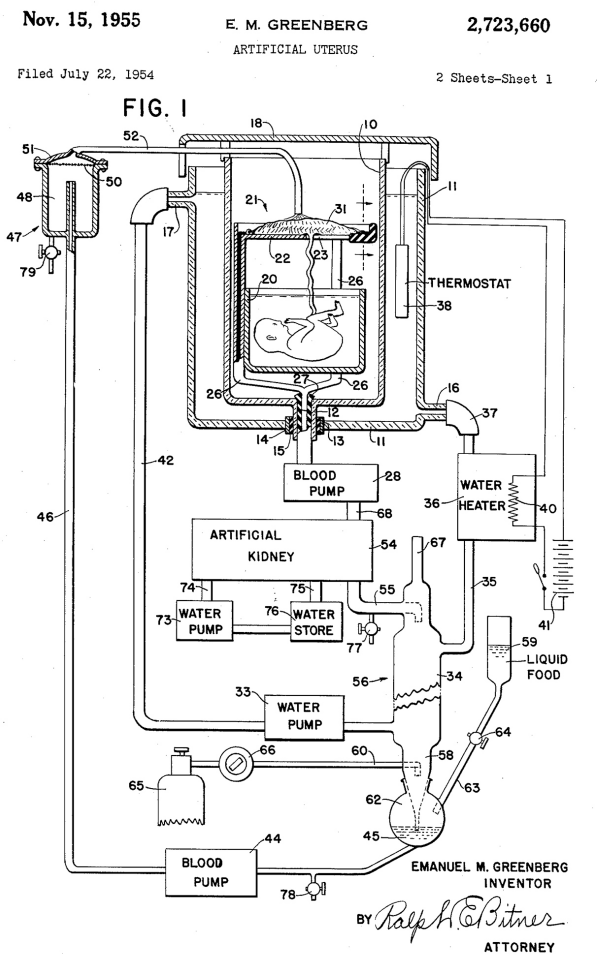


Illustration of an artificial womb patented by Emanuel M. Greenberg in 1955.

Nearly fifty years later, the antagonism between the ideological positions taken on this issue appears paroxysmal. From the already existing prospect of engineering barriers to sexual reproduction between otherwise incompatible organisms, to cloning; from recent developments in synthetic biology where technologically driven progressionist hypotheses often meet liberal forms of eugenics, to the transhumanist aspiration to remove sexuality from the reproductive equation through technological mastery; and from ecofeminist claims hastily translated into conservative calls to nature, to practices and policies attempting to redress lost natural balances, the articulation of sex and reproduction constitutes a politically contested territory, simultaneously exposed and obscured, a dark room which this issue sets out to perturb.

The Chromium Bower

As Michel Foucault famously stated in *The History of Sexuality*, "What is peculiar in modern societies, in fact, is not that they consigned sex to a shadow existence, but that they dedicated themselves to speaking of it *ad infinitum*, while exploiting it as *the* secret."[7] Sexuality, as a demarcated zone of somatic experience deemed to be deeply singular, has historically formed a decisive conduit for exploring the mutual reliance of forms of embodied life. As such, it has become in the modern and contemporary imaginaries the ultimate form of individualizing truth, to the extent that today, from incels to ecosexuals, from sexbots to teledildonics, it grew into the truth, *par excellence*, of the individual.

In this regard, nowhere can the advent and continuing unfolding of biopolitics be thought and felt more intensely than in the sexual realm. Life's explicit inclusion in politics inaugurated modern sovereignty and its governmental and economic techniques: a new relationship between biological life and the state was created—one that politicized the body to foster, multiply, and "put life in order."[8] The repositioning of biological life at the center of both politics and economics brought the conditionality of the world upon the living under great scientific and social scrutiny, opening it up to new knowledge and interventions on a grand scale. One of the key insights of biopolitics is the acknowledgement that the decision over biological individuals (rather than classical subjects) serves as an elementary definition of what modern politics is. Crucially, the politicization of life as such within democracy has brought about an abundant labor force for capitalism, as well as regulated the rules of its inclusion or exclusion. There, sexuality has had an exceptional ability to stage the embodiment of a repressed unconscious material accumulated by its eschewal in the Western episteme, yet for this reason it has been equally liable to involuntarily repeat its subjections, to make life increasingly available as the core object of capitalism, and to become a vector of increased commodification of the flesh.

Still from David Cronenberg's *Crash*, 1996.

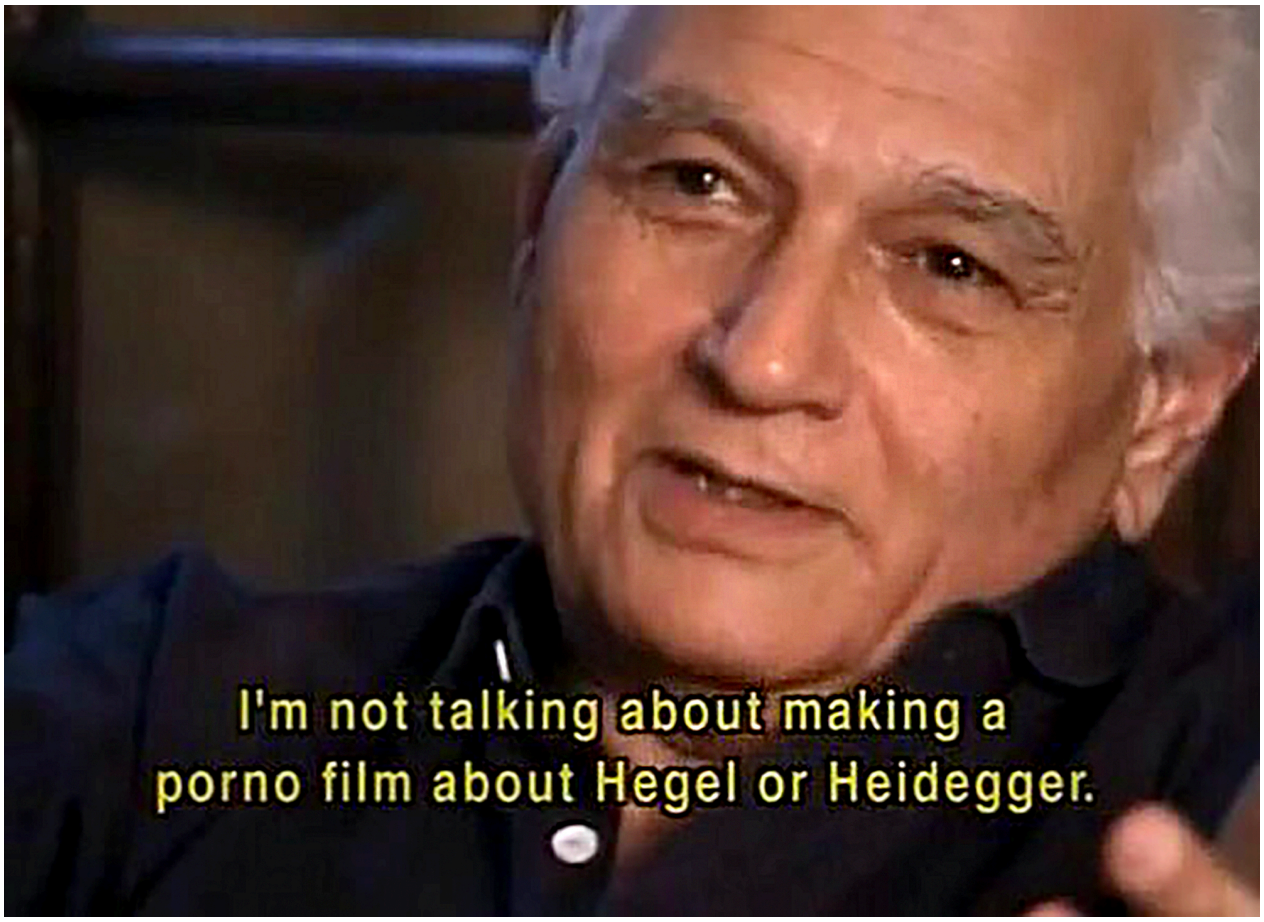
Deepening this logic, neoliberal policies have increasingly subsumed the old separation between production and reproduction. As Michael Feher underlines, human capital tends to become the dominant subjective form.[9] This transformation, which is as much economic as subjective, abolishes the sovereignty of reproductive life (the part of life devoted to reproduction that supposedly cannot be exchanged for money) by opening it to the value-form. In other words: the putatively infinite open-endedness of techno-capitalism's production of new life-forms, entities, partners, and bodies (anything from gene splicing to sex dolls), within which we become subject to accelerating morphological, affective, sexual, biochemical, romantic, inter-special, and phantasmatic mutations, is simultaneously legible as a cartography of power. As Paul B. Preciado has claimed, it is "possible to sketch out a new cartography of the transformations of industrial production during the previous century, using an axis of the political and technical management of the body, sex, and identity."[10] This axis, which is in fact nothing more than a regulative and aesthetic control of life inherent to capitalism's subsumption of reproduction, calls for the "somato-political"[11] analysis of the contemporary liberal quest to liberate life as aesthetic praxis (to "change life") and has guided the construction of this issue, leading it to explore sexuality as a decisive conduit for the critique of ideology.

Abyss Creations

When the company Abyss Creations first released in 2017 their AI sex-robot *Harmony*, debates polarized around those arguing that sexbots are a deeply pernicious development that serves to reinforce and reproduce dangerous power structures and to legitimize the exploitation and sexual objectification of women and children, and those arguing that they may in fact serve a therapeutic and even emancipatory function. By claiming that there is something inherently instinctual or natural about the way we desire or have sex, both arguments however missed the profound articulation of desire and sex to artifice. The sexbot materializes and explicitly reconstitutes the "inhuman partner" that emerges in the wavering of love/sex/desire between the flesh and the artefactual, making explicit the libidinal economy at work in both love (and sex) and the uncanny encounter with Artificial Intelligence. As such, it inhabits and embodies an ontological void, from which it holds back at us a picture of desire and sex as abysses of meaning.

Love has historically embodied such an abyss, resisting reasons and justifications. Filial love is often qualified this way to insist on its existence beyond choice. Romantic love, by contrast, foregrounds a conception that oscillates between passion and decision. On the one hand, love is an extremely private, extra-discursively felt condition, a dark room in which we blunder around with no map and no compass. On the other hand, love is also necessarily a shared form of sociality, though this sharing is archetypically private or exclusive. Love, like sexuality and gender, is nothing if not a concept, bound up or structured in various discourses and norms. The unsaid and unseen of love and sex is constituted by what is said and seen of it: it throbs at the threshold of the private and the public, the said and unsaid, the discursive and non-discursive, it is a primary site for both thinking and feeling continuity and discontinuity, binding and the unbound, pleasure and pain, union and alienation. As such, love may be nothing else than the basic unit of political subjectivity, the feeling around which we take decisions and organize structures in which our rational and political commitments are ultimately tested.

Mapping the philosophical, aesthetic and political coordinates of the nexus of love, sex and reproduction, the contributions gathered in this issue navigate this abyss, trying to confront the difficult task of assessing how love and sex's resistance to rational explanation can actually play a role in redefining what we understand by reason.



Still from Kirby Dick's documentary *Derrida*, 2002.

Footnotes

1. Herman Hesse. *The Glass Bead Game* (1943). Translated by Mervyn Savill and Clara and Richard Winston. Holt, Rinehart and Winston, 1949.

2. For example, normatively defined social roles—such as the bride—constituted types, while tokens such as shells acted as a primitive form of money constituting a social technology for the organization of reproductive rights.

3. Shulamith Firestone. *The Dialectic of Sex: The Case for Feminist Revolution*. Bentham Books, 1970, p. 72.

4. Firestone, p. 192.

5. Firestone, p. 199.

6. Firestone, p. 201.

7. Michel Foucault. *The Will to Knowledge: The History of Sexuality*, vol. I (1978). Translated by Robert Hurley. Penguin, 1990, p. 35

8. Foucault, p. 138

9. Michael Feher. “Self-Appreciation; or, The Aspirations of Human-Capital.” *Public Culture* 21, no.1, Winter 2009, pp. 21–41.

10. Paul B. Preciado. *Testo Junkie: Sex, Drugs, and Biopolitics in the Pharmacopornographic Era* (2008). Translated by Bruce Benderson. The Feminist Press, 2013, p. 25.

11. This refers to Michel Foucault’s notion of “somato-pouvoir.” See Michel Foucault. *Surveiller et punir : Naissance de la prison*. Gallimard, 1975.

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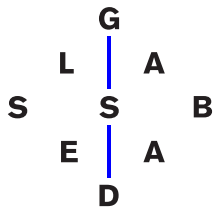

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Disciplined Bodies and Ideology Critique

Sally Haslanger

We live in a world where injustice is rampant. The injustice takes many forms, and is upheld in a variety of ways. For example, in the United States and across the world, legal and other institutional measures are defended as protecting liberal values, but in fact restrict religious and cultural freedom, sexuality and gender expression, bodily autonomy, and integrity. They undermine democracy, enable and reinforce plutocracy, oligarchy, and autocracy. Neo-liberal economic systems not only allow, but reward, exploitation, environmental degradation, and corruption. The list could go on. Such institutions are backed up by incarceration, torture, military blockades, police brutality, and war.

In addition, injustice is maintained by ideology. Ideology critique is essential to lessen the wrongs that are perpetrated not only on the battlefield and in government, but in practices of everyday life. In what follows, I will consider how the body, and our embodied agency, is shaped by culture, and will raise concerns about strategies that seek a ground for critique in the body. I will then suggest that the body cannot provide this and, more importantly, that critique cannot and should not seek a neutral “ground.” Epistemic and moral warrant, both of theories and of social and cultural practices, is only achieved historically and holistically. Moreover, perhaps surprisingly, this is a lesson we can draw from standpoint epistemology.

Ideology and Subjection[1]

My starting point for understanding ideology is Louis Althusser's work. In his essay "Ideology and Ideological State Apparatuses,"[2] Althusser distinguishes *repressive state apparatuses* (RSAs) and *ideological state apparatuses* (ISAs). RSAs include the "government, administration, army, courts, prisons," that "function by violence" or "massively and predominantly by repression." ISAs, including religion, education, the family, the legal system, the political system, trade unions, communications/media, and culture ("literature, the arts, sports, etc.") "function massively and predominantly by ideology." (No state apparatus is purely one or the other, and each depends crucially on the other, though in modern society, the ISAs are the dominant mode of social management.)
In Althusser's view, the role of ISAs and RSAs, together, is to reproduce the productive forces within specific relations of production. Althusser highlights the educational system (or the "school-family") as the primary contemporary ISA, for students learn in school the "know-how" required for participation in production. However, learning technical "know-how" is not enough:

> *Besides these techniques and knowledges, and in learning them, children at school also learn the 'rules' of good behaviour, i.e. the attitude that should be observed by every agent in the division of labour, according to the job he is 'destined' for: rules of morality, civic and professional conscience, which actually means rules of respect for the socio-technical division of labour and ultimately the rules of the order established by class domination. They also learn to 'speak proper French', to 'handle' the workers correctly, i.e. actually (for the future capitalists and their servants) to 'order them about' properly, i.e. (ideally) to 'speak to them' in the right way, etc.*[3]

A crucial difference between an ISA and an RSA is that individuals are hailed into a subject position by an ISA, rather than violently forced into it; and it is characteristic of those "good subjects" who respond to the hailing that they take up the norms as binding on themselves. As a result, they do not need to be coercively managed; they work "all by themselves"![4]
This interpretation of modern power is developed in Michel Foucault's book *Discipline and Punish*: "The perfection of power should tend to render its actual exercise unnecessary."[5] In this work, Foucault meticulously chronicles the ways in which modern power is exercised less by coercion and more by discipline—the crafting of subjects who monitor and manage themselves, their bodies, to conform to the demands of social position. Discipline, as Foucault explicates it, works primarily through surveillance, first

the surveillance of others, and then self-surveillance. Surveillance is an epistemic activity: the agent is at risk of being exposed. Fear of exposure—being found out as noncompliant, incompetent, abnormal—is, then, a mechanism for shaping subjects. The primary site of discipline, for Foucault, is the body:

> *The historical moment of the disciplines was the moment when the art of the human body was born, which was directed not only at the growth of its skills, nor at the intensification of its subjection, but at the formation of a relation that in the mechanism itself makes it more obedient as it becomes more useful, and conversely… a 'political anatomy,' which is also a 'mechanics of power,' was being born; it defined how one may have a hold over others' bodies, not only so that they may do what one wishes, but so they may operate as one wishes, with the techniques, the speed, and the efficiency that one determines. Thus discipline produces subjected and practiced bodies, docile bodies.*[6]

This quotation suggests a disciplining agent—individual or institutional—who manages the form and exercise of discipline. However, Foucault claims that disciplinary powers "go right down into the depths of society."[7] Institutionally "unbounded" discipline occurs through social norms and is often more masked, so difficult to identify. As Sandra Bartky points out, this is characteristic of gender: "The absence of a formal institutional structure and of authorities invested with the power to carry out institutional directives creates the impression that the production of femininity is either entirely voluntary or natural."[8]

Barbara Kruger. Untitled (Your Body is a Battleground), 1989. Photographic silkscreen on vinyl, 112 x 112 in. The Broad, Los Angeles.

Women's bodies are constrained by norms specifying shape, size, motility, appearance ("A woman's skin must be soft, supple, hairless, and smooth; ideally, it should betray no sign of wear, experience, age, or deep thought.").[9] This is not usually achieved directly by coercion. Under surveillance, we do it to ourselves, voluntarily. Over time, femininity becomes us (pun intended).

> *[And] insofar as the disciplinary practices of femininity produce a "subjected and practiced," an inferiorized, body, they must be understood as aspects of a far larger discipline, an oppressive and inegalitarian system of sexual subordination. This system aims at turning women into the docile and compliant companions of men just as surely as the army aims to turn its raw recruits into soldiers.*[10]

At the same time, the micro-powers that create docile bodies also "define numerable points of confrontation, focuses of instability, each of which has its own risks of conflict, of struggles, and of an at least temporary inversion of the power relations."[11]

Leaving aside many complexities of interpretation and details of Althusser, Foucault, and Bartky, two ideas from this tradition are relevant to a discussion of embodied knowledge. First, self-knowledge and self-mastery are not politically innocent. What I know about myself (what I attend to, what is true of me, what I make true of myself through self-management) is not necessarily an adequate starting point for critique or liberation. First-person experience, or even the shared experiences of a group, may only be evidence of the effects of ideology. Second, ideology is not simply a matter of beliefs, but acts on and trains our bodies, our perception, our desires, our emotions, through our engagement in practices. In order to consistently conform to social norms, it is much easier to identify with them than merely to go through the motions.

My conception of ideology is Althusserian. We participate in social practices guided by a set of public meanings, scripts, etc.—a complex *cultural technē.* Practices organize us around things taken to have more or less value; let us call these (assumed or constructed) *sources*[12] of value and disvalue. Some sources are material (such as medicine, traffic, toxic waste), and others immaterial (such as time, knowledge, boredom). We are "hailed" into practices in a variety of ways, e.g., we are hailed into speaking English by having English spoken to us; we are hailed into the role of student by being sent to school and finding ourselves responding to the teacher as an authority (nudged by coercion); we are hailed into adulthood by having to pay the rent (with threat of coercion in the background). We then develop ways of being and thinking so that we are (more or less) fluent English speakers, fluent students, fluent rent-paying adults. Ideology is not a set of beliefs, though it may produce belief. As Althusser says, "Ideology always exists in an apparatus and its practice or practices. Its existence is material."[13]

Our social practices and the corresponding cultural technēs are a mixed bag. Some are empowering and valuable; some are efficient and practical; others, however, function to sustain an unjust (capitalist, racist, sexist, homophobic, etc.) system. I use the term 'ideology' in the pejorative sense. An ideology is a cultural technē "gone wrong"—it guides practices and structures that organize us in unjust ways, or it prevents us from aptly recognizing what is of value and what is not.

Situated Knowledge and Standpoint Epistemology

Ideology is pernicious. We—both the dominant and the subordinate—are enlisted in unjust practices; at least many of us internalize the norms and perspective on the world they demand. (This is what allows for fluent agency; those who do not internalize the norms are burdened with huge cognitive and practical demands.) But if we are

constituted as embodied social subjects through ideological practices, then where do we stand to critique them? We cannot trust our experience of meaning to be a reliable guide to justice.[14] What source of knowledge is resilient even under conditions of subjection? The problem is pressing in two ways. First, discipline that is bad overall may be valuable and empowering for the individual. As Bartky explains:

> *Whatever its ultimate effect, discipline can provide the individual upon whom it is imposed with a sense of mastery as well as a secure sense of identity. There is a certain contradiction here: While its imposition may promote a larger disempowerment, discipline may bring with it a certain development of a person's powers. Women, then, like other skilled individuals, have a stake in the perpetuation of their skills... Hence, [a] feminism ... that questions the patriarchal construction of the female body, threatens women with a certain de-skilling, something people normally resist: Beyond this, it calls into question that aspect of personal identity which is tied to the development of a sense of competence.*[15]

Second, not all critiques of ideology are equally good. For example, contemporary neo-liberalism disciplines us to be either global consumers who pursue our individual ends through the accumulation of goods and capital, or global producers whose survival depends on producing globally appealing goods and services. Those traditionalist and nationalist movements that resist this by calling for a re-entrenchment of (so-called) traditional forms of life understand that something of value has been lost and they are suffering the effects of injustice, but the critique misfires, for emancipation is not achieved through regression to earlier forms of injustice. But on what basis do we reject such movements? They are right to be critical of the current social order, but where do they go wrong?

Standpoint epistemology has historically been proposed as a response to the problem of ideology. It offered hope for a privileged epistemic position from which ideology would be revealed as such, and emancipatory critique could be launched. Usually, those positioned as subordinate are assumed to be better qualified to occupy a privileged position; but given the problem of ideology, it cannot be assumed that the subordinate, simply by virtue of their *social* position, have a privileged *epistemic* position. Women do not always support feminism; members of the working class do not always condemn capitalism; many members of racial and ethnic minority groups assimilate, taking up the values and the practices of the dominant racial or ethnic groups. As Nancy Hartsock in her classic paper "The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism" explicitly argues, a standpoint:

> *…is achieved rather than obvious, a mediated rather than immediate understanding. Because the ruling group controls the means of mental as well as physical production, the production of ideals as well as goods, the standpoint of the oppressed represents an achievement both of science (analysis) and of political struggle on the basis of which this analysis can be conducted.*[16]

Critique begins not among the contented—those who identify with the norms structuring their social position, the true-believers—but among those who struggle, who experience discomfort or pain, who refuse to be shamed and humiliated when they fail to meet the standards expected of them.

This is not to deny that experiences of the subordinate, broadly speaking, are relevant to critique. Individuals bring to 'the context of discovery'[17] not only different cognitive, perceptual, and physical skills and talents, but also an interest in different kinds of questions and access to different kinds of information, due to their social position. Those who do the bulk of caregiving—namely, women—will know different things about caregiving than those who are not skilled in this work and are not interested in it. And the interpretation of a researcher's social position affects how subjects respond to their inquiries. Good empirical science depends on attending to social position. But what transforms a social position into a *critical* standpoint?

Seeking a source "outside" of ideology to ground critique, some early feminist standpoint theorists took the female body to be a foundational site for critical insight.[18] Assuming that dualisms between mind and body, reason and emotion, self and other, ideal and material are ideological tools in the maintenance of patriarchy, some postulated a shared source of critical insight:

> *… centered on the experience of living in a female rather than male body. There are a series of boundary challenges inherent in the female physiology—challenges which make it impossible to maintain rigid separation from the object world. Menstruation, coitus, pregnancy, childbirth, lactation—all represent challenges to bodily boundaries.*[19]

March for abortion rights, 1974, Bruxelles_DR. "It's my belly Mr. judges".

There are, of course, multiple problems with this approach. First, not all women, and of course, not all feminists, experience menstruation, coitus, pregnancy, childbirth, lactation; and considering the history of feminist activism, it is not plausible that the physical experience of such activities is the basis for, or causal genesis, of critique. Second, even if the physical conditions and acts mentioned (and others similar to them) can be described in ways that challenge the suspect dualisms, an invocation of the body as a "ground" of critique simply pushes the question back: how does one develop the alternative descriptions, recognize their critical potential (not all monisms are liberatory!), and deploy them to challenge patriarchal ideology, given that, *by hypothesis,* subjectivity—and so, experience—is disciplined to maintain patriarchy?[20] More needs to be said. And third, critique is *normative*: this practice, structure, system, is unjust. What is the source of normative leverage? Suppose we come to recognize that the dualisms in question (or other conceptual tools) are descriptively inadequate, e.g., that mind and body, reason and emotion, are not thoroughly distinct, or that they each incorrectly presume a binary. How do we transform this into a political challenge?

Early materialist feminists were wrong, I think, to assume that anatomical sex differences are a privileged foundation for critique. However, this is not to reject their attention to reproductive labor. One need not find a source outside of culture, outside of ideology, to locate resources for critique. Ideology is not thoroughly hegemonic; subjection is, in the first instance, role and practice specific. Our lives involve participation in multiple practices that are open-ended and often in tension with each other; as a result, cultural technēs are not internally consistent. Moreover, discipline is not all-controlling; there is always an excess that surpasses the presumed "closure" of the dominant ideology.[21] Some part of the excess may be material, bodily, but even if the body speaks, understanding it requires interpretation. And finally, as the quote above from Foucault makes clear, the workings of micro-power are unstable and contested.

Ideology critique emerges in a variety of ways. In the context of liberation movements, it often begins with everyday temptations to resist discipline, which may build into refusal to participate. Iris Young refers to this as a "desiring negation":

> *Each social reality presents its own unrealized possibilities, experienced as lacks and desires. Norms and ideals arise from the yearning that is an expression of freedom: it does not have to be this way, it could be otherwise.*[22]

One person's resistance or refusal can be joined by others, motivating a collective reinterpretation of and calls to change the practice. Emotional labor is often invisible because it is taken for granted, naturalized as women's role. But some laborers become fed up, and self-criticism ("I must be a bad mother/wife/partner/colleague") is no longer plausible. In some cases this is experienced as a low point that must be overcome; in other cases therapy or medication helps; in still other cases, friends step in and provide support. And then the feeling passes. But because ideology is not hegemonic and in most contexts, resistance has a history, resources available in the culture can provide an "injustice frame" for the experience.

> *An existing* oppositional culture *provides ideas, rituals, and long-standing patterns of interaction that overt political struggle can refine and develop to create a more mature oppositional consciousness[,] … a history of* segregation *with some autonomy, providing "free spaces" for the elaboration and testing of ideas;* borrowing *from previous successful movements; the* synthesis *of more than one oppositional strand, creating more than the sum of its parts; mutually supportive* interaction, *bridging divides in emotional commitments; and* consensus creativity *by activists, drawing on the traditions and practices of everyday life.*[23]

Oppositional consciousness transforms into a movement when those in the group "demand changes in the polity, economy or society to rectify those injustices."[24]

Kurdish YPJ fighters, 2017. Wikimedia Commons

Knowledge and Normativity

In the previous section I suggested that there are two issues that arise for ideology critique: why should individuals who are successfully disciplined, and so successfully integrated into social life with a secure identity, be willing to sacrifice the skills, security, and even power that this affords? And what is the source of normativity? How do we distinguish legitimate from illegitimate calls to resist the dominant social order?
I will not be able to provide a fully developed answer to these questions here. However, the beginning of an answer lies in remembering that the source of a standpoint is pain, struggle, alienation, disaffection. Such responses to one's circumstances are morally significant, even if one's interpretation of them is misguided, and even if one lacks an adequate "injustice frame" to transform them into warranted moral claims against others. Suffering is a (defeasible) sign that something is going wrong. Not everyone who occupies a subordinate social position or, more generally, a social position in an unjust structure, suffers; as I have argued, ideology enjoins complicity. It may take a huge amount of work—personal and political—to convince those who are happily, though

ideologically, disciplined to sacrifice their skills, their stability, even their identity, for justice. But it is not a mystery why those who suffer search for and achieve a critical standpoint.

The normative question is more difficult. On the conception of ideology I have sketched, ideology functions to sustain injustice by masking or distorting what is good, right, just. It fails us both morally and epistemically, and fails us morally *by* failing us epistemically. This failure is sustained, in part, by the injunction that our epistemic efforts must remain value-neutral. Once the social world is structured unjustly, and the task of inquiry is merely to describe it in neutral terms, how can we gain critical leverage? What is, is. To say it should be different requires normative, evaluative vocabulary.

The idea that we need a source or "ground" of social critique outside of ideology assumes a foundationalist model of justification. I reject foundationalist assumptions according to which all knowledge must be grounded in experience or a "pre-theoretical" anchor.[25] Both epistemic and moral foundationalism are unsupportable. The epistemic task in addressing ideology is not to justify or critique particular claims, but to shift to a different paradigm. As W. V. O. Quine would say, beliefs "face the tribunal of sense experience not individually, but only as a corporate body."[26] We need not follow Quine in limiting ourselves to beliefs—or the tribunal of *sense* experience—and can expand the attitudes to include a full range of mental states and acts, including perception more generally, intuition, emotion, reasoning, and other cognitive, affective, and evaluative judgments.

For decades, feminists and other critical theorists have argued that values are not only unavoidable in inquiry, but are important tools that reveal features of the world that would otherwise be neglected.[27] Medical research would be an utter failure if it were not guided by the value of human health. Values can also occlude facts: much of contemporary economic research goes badly wrong because it is driven by pernicious values. Ideology critique is guided by values that arise from the suffering of those embedded in unjust structures: both the subordinate and the dominant who resist complicity.[28] It is no surprise, then, that Karl Marx himself took critical theory to be situated within a movement and guided by its values:

> *Nothing prevents us, therefore, from lining our criticism with a criticism of politics, from taking sides in politics, i.e., from entering into real struggles and identifying ourselves with them.*[29]

A standpoint is a position occupied by a group, not an individual. The initial impulse arises from being embedded in multiple—perhaps conflicting—practices, from adjusting to new practices, or from facing circumstances or conditions that render the existing practice questionable (perhaps through the development of new technologies or changes in the natural world such as global warming). Moral and cognitive estrangement is valuable here, for estrangement allows one to gain critical perspective.[30] However, a standpoint is not achieved simply by having a recalcitrant experience or "outlaw" emotion. A critical standpoint is achieved collectively through reflection on and evaluation of the testimony and insights of others in spaces open to heterodox ideas and feelings, together with empirical investigation and experimentation with new tools.

Booka and Chris Durack sparring with a speed bag, Queensland, 1916. State Library of Queensland

An adequate standpoint will illuminate injustice in the current social order. The justification of critique goes along with the epistemic credentials of the standpoint from which it arises; however, the project is holistic rather than foundational, and not merely doxastic. So the standpoint of a regressive social movement can be tested and shown to

be inadequate, e.g., if it fails to satisfy constitutive epistemic norms—including empirical adequacy; if it is closed to reflective review and critique; if it silences or undermines the credibility of stakeholders; and if its social meanings and other cultural tools fail to provide a basis for meaningful coordination.[31]

Our bodies constrain us, but are not static, uninterpreted, simply "given." Embodiment is a site of discipline. Some forms of discipline are empowering and just. Some discipline that feels empowering is unjust, and some discipline that is just is disempowering. First-person experience of joy or pain, or anything else, provides bits of evidence that should be taken into account in a critical evaluation of our social practices and larger structures. But experience itself must be critically interrogated: we must ask why we respond as we do and situate our responses in a bigger picture that includes the responses of others, empirical and historical research, and broader values. The effort to "ground" critique in the body, or in anything else, is a mistake. Although some suggest that standpoint epistemology offers a "privileged" perspective, this is misleading, insofar as it suggests a foundationalist model of justification. Standpoint epistemology brings a substantive commitment to justice to our efforts to understand social reality, and in doing so, highlights phenomena that are eclipsed by ideology. But critique must be evaluated collectively and holistically. The adequacy of a critical standpoint is always contestable, and can only be evaluated, ultimately, in practice.[32]

The author wants to thank Ásta, Louise Antony, Susan Brison, Robin Celikates, Kristina Lepold, Jeffrey Stout, and Robin Zheng for helpful discussion. (#_ftnref5)

Footnotes

1. The terms 'subject,' 'subjectivity,' 'subjection,' 'subjectivation' (or 'subjectivization') are used in multiple ways in the literature on Louis Althusser and Michel Foucault. Two sets of issues are relevant: (i) how ISAs/power/knowledge construct subjects and how they construct subjectivity (understood psychologically), and (ii) how and to what extent the construction is subjugating, endured passively (as opposed to taken up actively), and politically suspect. I will use the term 'subjection' for the construction of subjects (and only derivatively the construction of subjectivity); I will assume (as should be clear) that one is active in becoming a subject; and that subjection happens in both subordinate and dominant positions. See notably Kristina Lepold. "An Ideology Critique of Recognition: Judith Butler in the Context of the Contemporary Debate on Recognition." *Constellations,* no. 25, 2018, pp. 474–484.

2. Louis Althusser. "Ideology and Ideological State Apparatuses" (1971). *On the Reproduction of Capitalism*, translated by Ben Brewster, London, Verso, 2014.

3. Althusser, pp. 235–236.

4. Althusser, p. 269.

5. Michel Foucault. *Discipline and Punish: The Birth of the Prison* (1975). Translated by Alan Sheridan, Random House, 1979, p. 201.

6. Foucault, pp. 137–138.

7. Foucault, p. 27.

8. Sandra Bartky. *Femininity and Domination: Studies in the Phenomenology of Oppression.* Routledge, 1990, p. 75.

9. Bartky, p. 69.

10. Bartky, p. 73.

11. Foucault, p. 27.

12. In the past, following Giddens and Sewell, I have used the term 'resources.' The term 'resource' however has a positive connotation and I have been urged to find another way of speaking of resources that more easily includes things taken to have negative value. (Thanks for this nudge to Jeffrey Stout.) Until I find something better, I will use 'sources.' Note that because we are not assuming that what we "take to be" of value or disvalue is correctly valued, we should not assume that 'source' is factive.

13. Althusser, p. 259.

14. Joan W. Scott. "The Evidence of Experience." Critical Inquiry, vol. 17, no. 4, 1991, pp. 773–797.

15. Bartky, p. 77.

16. Nancy Hartsock. "The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism." *Discovering Reality*, edited by S. Harding and M. B. Hintikka. *Synthese Library*, vol. 161, Springer, 1983, p. 288.

17. I here refer to the common distinction one finds in the philosophy of science literature between the "context of discovery" and the "context of justification." Many positivist philosophers of science allow that values play a role in the context of discovery but should be banned from the context of justification. I'm allowing that there are different contexts for research although I believe, against the positivists, that the context of justification also includes values – this falls out of the holism about justification I favor.

18. Hartsock, p. 289.

19. Hartsock, p. 294.

20. I do not mean here to commit myself to patriarchy as a system. Some complex and fragmented systems have patriarchal elements; that is to say, they oppress women. See Sally Haslanger. "Why I Don't Believe in Patriarchy: Comments on Kate Manne's *Down Girl*." *Philosophy and Phenomenological Research,* forthcoming.

21. This is a significant theme in Derrida's work. See notably, amongst many others, Jack M. Balkin. "Nested Oppositions." *The Yale Law Journal,* vol. 99, no. 7, 1990, pp. 1669–1705; and Saul Newman "Derrida's Deconstruction of Authority." *Philosophy and Social Criticism,* vol. 27, no. 3, 2001, pp. 1–20.

22. Iris Young. *Justice and the Politics of Difference.* Princeton University Press, 1990, pp. 6–7.

23. Jane Mansbridge and Aldon Morris. Oppositional Consciousness: The Subjective Roots of Social Progress. University of Chicago Press, 2001, pp. 7–8.

24. Mansbridge and Morris, p. 1.

25. See Sally Haslanger. "Agency within Structures and Warranted Resistance: Responses to Commentators." *Australasian Philosophy Review,* forthcoming.

26. W. V. O. Quine. "Two Dogmas of Empiricism" (1953). *From a Logical Point of View*, Harvard University Press, 1980, p. 41.

27. See notably Elizabeth Anderson. "Uses of Value Judgments in Science: A General Argument, with Lessons from a Case Study of Feminist Research on Divorce." *Hypatia: A Journal of Feminist Philosophy,* vol. 19, no. 1, 2004, pp. 1–24; Elizabeth Anderson. "Knowledge, Human Interests, and Objectivity in Feminist Epistemology." *Philosophical Topics,* vol. 23, no. 2, 1995, pp. 27–58; Louise Antony. "Finding the Truth." *Duquesne Law Review* vol. 56, no. 2, 2018, pp. 7–19; and Louise Antony. "Quine As Feminist: The Radical Import of Naturalized Epistemology." *A Mind of One's Own: Feminist Essays on Reason and Objectivity,* edited by Louise Antony and Charlotte Witt, Westview Press, 1993, pp. 185–226.

28. Thanks to Susan Brison who has emphasized how the dominant can also suffer from being implicated in injustice they abhor and from empathy with the subordinate. These experiences are also epistemically relevant for critique.

29. Karl Marx. "Letter to Ruge," 1844.

30. Stephanie Kapusta. "The Social Practice of Cognitive Estrangement." *Australasian Philosophy Review*, forthcoming.

31. It is valuable to compare this idea with Helen Longino's conception of scientific objectivity. See Helen Longino. *Science as Social Knowledge*. Princeton University Press, 1990. The project here is not to offer criteria for an acceptable scientific theory, however, but rather, criteria for evaluating a cultural technē. These comments are only a gesture towards what constitutes an acceptable standpoint.

32. Elisabeth Anderson. "Social Movements, Experiments in Living and Moral Progress: Case Studies from Britain's Abolition of Slavery." The Lindley Lecture, University of Kansas, 2014.

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Mutations of Sergeant Sade

Olivier Surel

In 1975, in an interview entitled "Sade, Sergeant of Sex,"[1] a critic from *Cinématographe* questioned Michel Foucault about Pasolini's *Salò or the 120 Days of Sodom* (1975) and some other films that the interviewer cited for their "sadistic" nature. In response, Foucault immediately and almost randomly brought up Werner Schroeter's *The Death of Maria Malibran* (1972), to emphasize the use of pleasures as a way of deprogramming the organic functions of the body. To him, *Salò* in contrast constitutes the cinematic symptom of a civilization that experiences desire solely through the regulated order of anatomy and especially through the prism of a "political apocalypse," represented by the fictive Nazi-Fascist republic that serves as the film's setting.

The representation of the alliance of Nazism and sadism in *Salò* or in Liliana Cavani's *The Night Porter* (1974) did not find favor in Foucault's eyes as he considered it an historical error. "It's the foul petit bourgeois dream of racial hygiene that underlies the Nazi dream," he goes on to say. "Eros is absent."[2] Clearly, Foucault is thinking here less directly of the Marquis de Sade than of the intellectual construct that derives from a diagnosis regarding the libidinal economy attributed to Nazism, of the eroticism that he says is proper to a disciplinary society. He thus leaves aside the Pasolinian analysis of Italian capitalism. For the Pasolini of the *Scritti corsari*,[3] this neo-capitalism represented a more pernicious and definitive destruction of the social body than fascism itself. Foucault later acknowledged this aspect of the Pasolinian critique in a brief review of *Comizi d'amore* (*Love Meetings*) (1965) bearing the superb title "The Gray Mornings of Tolerance."[4]

Stills from Pier Paolo Pasolini's *Salò or the 120 Days of Sodom* (1975)

To give more substance to Pasolini's intent, it may be useful to consider in the background Georges Bataille's 1933 essay "The Psychological Structure of Fascism",[5] in which he defines the exercise of sovereign authority as a "differentiated sadistic activity," independent of any masochistic tendencies. Fascism would thus be a major instance thereof, enacting the institution of authority in the cruelest of ways. But even though Bataille's text also sheds light on many aspects of what Foucault calls a "disciplinary society," the discussion is only of sadism as a category of an "existential psychology," and not of Sade himself.

One can find lateral insights regarding these questions in Klaus Theweleit's *Male Fantasies*,[6] an exhaustive examination of the proto-fascist libidinal economy in the writings of the *Freikorps*, first published in Germany in 1976. Sade, although his place in this study remains anecdotal, exemplifies for the author a form of "romantic terrorism" in literature. He sees Sade and his ilk as representing a subjectivity that premeditates its object, fully conscious of its affects, whereas "when the fascist awakens from his destructive frenzy, by contrast, he does not believe he has really been evil."[7] The sexual sadism of a sergeant major in the *Bundeswehr* is discussed in the second volume, but the soldier in question, concerned with army regulations, qualified these affects as belonging primarily to the realm of his fantasies.[8] All of which seems to lend punctual support to Foucault's argument: there is something erroneous in the association of the object "Nazism" and the object "sadomasochism." But in the short 1975 interview, literary

history and medico-psychological knowledge do not contribute to the discussion, even in a critical way. It was simply a polemical moment, if stimulating for reflecting on these objects.

In contrast, Roland Barthes[9] based his criticism of Pasolini on a programmatic foundation. He formulated two precepts that I would summarize as follows: (a) the literature of Sade is essentially *fantasmatic* and hence not figurable; (b) fascism, a "constraining object" for thought, cannot be critiqued by analogy (and art can only *demonstrate* how it comes to be). In short: "all that which *derealizes* fascism is bad; and all that which *realizes* Sade is bad." The first proposition seems coherent to me with the ongoing historical urgency not to treat fascist barbarism as an ordinary aesthetic object, even under the aegis of artistic criticism. The second proposition does not seem to leave room for any form of destiny in cinema or in the visual arts for Sade's texts.

It remains that there has been an irreducible Sadeian dimension in the aesthetic field ever since these texts have circulated. In his 1967 preface to *Sade, My Neighbor*, Pierre Klossowski wrote that to be an atheist is to declare God to be nothing. Atheism, he wrote with ironical perplexity, thus essentially liberates itself from nothing. But the traces of this process of liberation are numerous, and Sade's writings are considered major traces thereof by those who read or experienced them in one form or another.[10] What is Sadeian in our sensibility and in our aesthetics may very well be, for one thing, our attachment to the very long decomposition of theocratic politics in Europe, and to what it has produced in subjectivity until now.[11]

On the level of political concepts, a similar role has been attributed to the writings of Spinoza: one of his most attentive readers writes of the "decomposition of Thomistic politics,"[12] by which he means that Spinoza's system and his reading of Machiavelli delivered a mortal blow to the politics based on Thomas Aquinas's theology. But if Sade had served such a purpose only, critical theorists such as Theodor Adorno and Max Horkheimer[13] would not have seen his writings as the complement of the "instrumental reason" they saw in Spinozism. To them, Sade's Juliette embodies the figure of the self-destruction of European reason that they call *amor intellectualis diaboli* (intellectual love of the devil). In other words, Juliette represents a logico-historical decadence of an *amor intellectualis Dei* (intellectual love of God, or of Nature), that one can stabilize in Spinoza's corpus as the self-affection of a collective subject (or a "multitude") in the deployment of a rationality subtracted from the State-form.[14]

The fact remains that Pasolini himself readily cast Spinoza as a cunning specter. In the play version of *Porcile* (*Pigsty*), the Amsterdam philosopher tries to convince a passive reader of the *Ethics* of the relative virtue of his taste for living amongst pigs. By the end of their exchange, Spinoza has abjured his own philosophy. In the film version of *Porcile*, this scene is replaced by the wanderings of a gang of medieval cannibals around the slopes of Mount Etna.[15]Pasolini may ultimately have been conscious of the sapping that he, like Adorno and Horkheimer, reserved for the author of the *Ethics*, whom he may have seen as one of the doctrinal supporters of a "neo-capitalism." In the wake of Foucault's critique, I now wonder whether he mishandled Sade with similar intentions.

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Berlin, Neukölln, 17/01/2019

Olivier Surel: Did you come across that interview with Foucault, "Sade, Sergeant of Sex"? I've been startled by one of its assertions, that for some viewers of Pasolini's *Salò*, the Nazis were evil erotic geniuses. And then he has this corrosive zinger, saying that Himmler was a chicken farmer, his wife, a nurse, and that the combination of their fantasies produced the concentration camps, the equation behind them being for him, "hospital plus chicken yard."

Samo Tomšič: Yes, these comparisons often reemerge in discussions regarding fascism, and they seem to bear some kind of negative fascination with the entire machinery of exhaustion of bodies. Here the extreme position would be the bodies of internees in the Nazi concentration camps, ultimately reduced to 'bare life,' which assumes the appearance of a thin layer of flesh covering the bones. But I must admit that this negative fascination fills me with discontent.

OS: And in that way Foucault underlines their wish to purify the social field of whoever they took to be subhuman. But again, Foucault is questioned about *Salò*, and to give weight to his argument, he implicitly if cheekily says that chicken farmers and nurses can only sustain a poor erotic imaginary. He's using that to say that there's no evil genius in whatever we can reconstruct of Nazi sexuality or erotics, that they were "the most disgusting petit bourgeois," and not great erotic madmen.

ST: To speak of the Nazis in such terms would suggest that one sees them as personifications of subjects presumably possessing some kind of surplus knowledge of sexuality, or as experts in *scientia sexualis*, sex scientists. This is already bordering on fetishism. But one could argue that in some way the Nazis enacted the very essence of toxic masculinity.

"Raincoat", illustration by Renzo Vespignani in Klaus Theweleit's *Male Fantasies*, Vol. 2 (1989)

OS: Someone recently wrote that the kinks of today were a mere reenacting of things that had been catalogued by Sade more than 200 years ago; it was a strange way of antiquating the present. Maybe one can more modestly say that some subversions of reproductive sexuality can coexist with a bourgeois management of sexuality. In Pasolini's film, we see how in Sade's narrative, the purported subversion of the content of the law reappears in the form of the law itself.

ST: Yes! But if we hold onto the critical assumption that there's no evil genius position in erotics and no "subject supposed to know," as Lacan would put it, then Sade exemplifies that the best one can do is to be a bureaucrat of possible sexual practices and object fixations. One part of what Foucault called "biopolitics" consists in this bureaucratic attitude towards the field of sexuality. The flipside of this attitude would be the attempt to regulate the juncture between the symbolic and the anatomical, to bring the two orders into a stable and adequate relation, whereas we know from psychoanalysis that

the sexual stands in excess over the anatomical, and that anatomy is anything but destiny (this time contrary to what Freud occasionally wrote). In any case, I would say that in the sexual field we do not meet geniuses, but experimenters.

OS: That would fit with Foucault's belief that the Western canon couldn't possibly produce an *ars erotica*, but only a *scientia sexualis* of sorts. Now if we go back to the text of *The 120 Days of Sodom* (1785/1904), it is indeed as if Sade reduced the method of natural history to a bureaucratic practice when it comes to sex. But I somehow still see it as a subtle subversion of the *scientia sexualis* rejected by Foucault's own erotics. In a way, this is in line with Early Modern attempts at producing natural histories of passions, but with a twist. In the book, the work of recounting the sexual acts is delegated to the *historiennes*, who are in fact not scientists but 'madams' of sorts. And by calling them that, the text is converting these pseudo-figures of sexual science into small-scale managers of the libidinal field indeed. So when it comes to the junction of the economic and the libidinal, Sade operates a pure reduction and basically says to the reader: "You might be shaken by what you'll read, but worry not, it will only cost you a bit of cum." And the talk of cost seems like an address to a sexualized *homo oeconomicus*: walk here freely, fear no God, at worst you will lose the merely physiological product of your *jouissance*.

ST: Yes, you will definitely lose less than a pound of flesh, you will sacrifice a bit of cum, or experience some arousal. One could say that Sade not only subverts s*cientia sexualis*, but entirely questions the Foucauldian opposition between *scientia sexualis* and *ars erotica*. Sade demonstrates that in the universe of Early Modern science knowledge remains a "means of enjoyment," and I am merely repeating Lacan's phrasing of the problem. So it would certainly be too hasty to say that pre-modern science was stained by libidinal fantasies (think of how in Aristotle the highest point of thought coincides with the highest point of pleasure) whereas modern science stands for complete rejection of enjoyment from the field of knowledge. No, science does not escape the libidinal sphere, even if it stands in a more or less antagonistic relation to it. According to Lacan the accumulative regime of knowledge invented by Descartes at the dawn of modernity should be thought together with the accumulative regime of value, hence with capitalism, and one could add that they both point toward the accumulative regime of enjoyment, in which surplus value marks the effort to quantify enjoyment. In order to accomplish this jump to the 'measure of pleasure,' if I may say so, one needs the intervention of science, precisely of modern science, since the premodern regime of knowledge was incapable of producing such quantification.

OS: I guess that in that specific sense, Sade's writings could well be taken as literary relics of the Early Modern production of surplus knowledge in the libidinal field. But there's much more to them than this.
ST: I guess one can interpret Sade's work in this way, as a text in which production of surplus knowledge concerning enjoyment constantly takes place. Then Sade's work would stand for nothing more and nothing less than a 'per-version' of *scientia sexualis*. But Sade also demonstrates the compulsive character of enjoyment, and in this respect he touches upon a crucial critical insight of psychoanalysis. In addition to this, one could raise the question whether modern science presupposes a subject that valorizes itself in the epistemic regime, with knowledge serving as a form of surplus enjoyment. Many 'spontaneous philosophies' of science insist that scientists practice science for the sake of science, produce knowledge for the sake of knowledge, and that this is what characterizes scientificity in the first place. But from Marx we know that production for the sake of production is a deeply libidinal thing. It is no coincidence that in all key passages of *Capital* (1867), Marx describes capital as the drive, speaking of the drive of enrichment, the drive of self-valorization, even the drive of extending the workday. If we take up the homology between science and capitalism seriously, then surplus knowledge, surplus value, and surplus enjoyment most certainly occupy the same structural position.[16]

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At the height of the revolutionary 18th century, Kant founded the project of a rational harmonization of society on a necessity of nature itself. The formulation of the moral imperative that he called categorical was also founded for him on a type (*Typus*) proper to the lawfulness of nature.[17] These texts can be discussed from the philosophical standpoint alone, but Jacques Lacan preferred reading them together with Sade, who wrote in his introduction to *The 120 Days of Sodom* that he was delivering something that had never been written before, not by the ancients or the moderns, nor more broadly by all those who fetishize "this beast" they call "Nature." Commenting on *Philosophy in the Bedroom* (1795), Lacan wrote the following:

> *[W]e hold that the Sadeian bedroom is equal to those places from which the schools of ancient philosophy took their name: Academy, Lyceum, Stoa. Here as there, the way for science is prepared by rectifying the position of ethics. In this, yes, a ground-clearing occurs which will have to make its way through the depths of taste for a hundred years for Freud's path to be passable. Count sixty more for someone to say the reason for all of that.*[18]

By and large, it is ill-advised to take Lacan literally, but in this case, I think we can. Sade cleared the (analytical) way for Freud through the "depths of taste." But it would be going too far to claim that Sade served solely to build up the fragile practice that is psychoanalysis. In this sense, we can limit ourselves to the proposition according to which in Sade, understood here as being the discoverer of libidinal economy, ethics is rectified, and science finds itself conditioned in a new way as a result.

It would remain to be seen how the long process that turned Sade into a 'sergeant' positions us in terms of ethics. In a sense, Foucault tried to answer this question in the first volume of *The History of Sexuality*, when he examines how sexuality in modern Europe became a subject of knowledge, and how sex constituted a "problem of truth"[19] bearing on what divides subjectivity at its core. For him, it was this problem that may have driven H. S. Ashbee, the presumed author of *My Secret Life* (1888), and perhaps Sade himself, to write. Following Foucault, we would also have to say how the Sadeian discourse has arisen in relation to different types of "terminal forms of power,"[20] first and foremost the type he calls "the juridical monarchy"[21] (and thereby also say why Pasolini chose to transpose Sade's text to a fictive republic). What unfolds in *The 120 Days of Sodom* is indeed something related to the illimitation of power over bodies, permitted by what Sade calls the "mysterious fortunes" of what we by now know as the first phase of capitalist accumulation.

But Foucault did not read Sade in the same way that Lacan did. If indeed any future metaphysics that will be able to come forward as science cannot ignore the libidinal sphere, and if indeed Sade delivers the complement of Kantism while tainting the purity of its morals, then we can see more clearly what the object of psychoanalysis is. In other words, Kant built a moral philosophy in which any dimension he thought "pathological" (e.g., that of pleasure) is in a surplus position. In reading Kant together with Sade, one can ask a simple and abyssal question: what happens when we put *jouissance* itself in the place of the categorical imperative? No doubt it was by starting from such a place that Freud could build his whole theory of drives, and we can recognize that this touches on something that can be called libidinal economy. In saying this, we also make headway in interpreting the writings of Sade. Now it remains for us to explore what these texts make possible in the "depths of taste."

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Paris, 8th arrondissement, 23/03/2019

OS: You've said a couple of times that you had read *The 120 Days of Sodom* at age 15, after a very bad acid trip had sent you back from Hawaii to California. I was wondering to what extent the structure of the book had an influence on the way you structured your first writings, given the fact that your first piece of writing was an 800-page pastiche of sorts of *The 120 Days*.

Dennis Cooper: Yeah, and I burned it all! But the structure was as important to me as the fact that it had material I was interested in. And the fact that it was unfinished and thereby became an avant-garde construction almost by accident. You know the way it devolves, and becomes a heap of notes and lists, it was all completely fascinating to me. I was really taken with it, and the way he deals with the family structure itself in it. But I wasn't using that kind of language; I was following whatever terrible way that I wrote and spoke back then. It was basically the same kind of idea except that it wasn't about politics or class in general or anything like that; it was about the hierarchy in place with the teachers where I was going to school, the power figures and the way they related to the students there. And the people they captured, how they were organizing into groups and how they carried experiments with them.

OS: So back in the seventies, following Sade was a way of putting your teenage self's fantasies into circulation?

DC: In a way, yes. But since I had many starts at writing with such material, and even though I was equipped for it, it was a way of figuring out if it wasn't just some haunting, fucked-up thing in my head and if it could be used to write serious fiction. And in turn it was a way to understand the fantasies. It was me and myself having a conversation, and trying to get to a quasi-objective viewpoint, to stratify the way they bounced between the very need to get them out and the necessity of making them accessible and legible. To make the material communicable as much as possible, but in a way that did not conceal or short shrift my own interests.

OS: I'm also wondering what you made of the locations in *The 120 Days*, the fact that we're reading about a castle in Switzerland turned playground for sex-crazed French aristocrats who abuse, mutilate, and kill the progeny they have captured, towards the end of the reign of Louis XIV. All of this has somehow become folkloric, and the "castles of subversion," as Annie Le Brun once called them, remained central fixtures from Sade on to the English gothic novel. But your fantasies were mainly originating, and literarily unfolding in the context of suburban California, and back in the era when Reagan was still the governor.

DC: Well, I wasn't interested in picking up something that was unfamiliar to me, namely the historical model that Sade put forward. So everything unfolded mostly between somebody's house and their swimming pool. And the fact that I was in Los Angeles was hugely important for a lot of reasons, one thing was that… There was that stuff in my head. And then it was a time when there were a lot of serial killers roaming around Los Angeles well into the seventies, including one who killed some boys of my age. And those were in the news and really intrigued me. The crimes were happening before DNA forensics, so you could easily get away with it. Los Angeles is a lot more built up now, but back then there was a lot of empty space, a lot of space where people didn't go, except for hikers sometimes. So you could just go and drop a body off in the scrub or in the woods, or by the side of the freeway. Also Los Angeles is very organized if you know it well but it can seem very disorganized, and back then Downtown was nothing; it wasn't the center yet. All of that just made it interesting for me, and I didn't have to pick up on a space that was really private and protected, except these one-story houses which themselves are in areas that are really open.

OS: And yet, years later, *The Marbled Swarm* (2011)[22] begins in a "Château Étage."

DC: Well, yes because I wanted to write a French novel! So there's this castle in rural France, but even then it all ends up taking place in somebody's apartment in Paris over and over, and it was part of my experimenting with setting up these models that were slowly becoming familiar to me but still foreign in some way.

OS: In the francophone world, it seems that Sade often served as a vector of self-stylization of the sexuality of the bourgeoisie. And when I first peeked through your *Marbled Swarm*, I said to myself: OK, he's had enough of the classical fantasies of francophone Sadeians, and he's tried to pervert their perversion, to skillfully exhaust their fantasy material with his own and into something that's much more than a parody.

DC: Oh yes, that's certainly true. And I was trying to stay away from literary models for that as much as I could. The aftermath was somehow Sadeian, but I was not deliberately thinking about Sade. The language was very baroque, and it is really what happens when you take English and try to over-fancy it, or at least try to make it tricky in a way that I imagined speaking French would be like. But nonetheless a lot of things permeated through my friendship with Catherine Robbe-Grillet, who is a dominatrix and very much like what you're describing! So a lot of the primary material in *The Marbled Swarm* is derived from my experience of being in her *château*.

Citroën Hypnos, inside construction view.

OS: What also struck me was that from there, you mobilized cultural elements that are somehow distant cousins of Roland Barthes' objects in his analysis of the 'mythologies' of 1950s France. For example the fact that the protagonist, a probable bastard son of Pierre Clémenti who retained some traits of the young cannibal in Pasolini's *Pigsty*, is driven around in a customized Citroën Hypnos. It is an actual prototype of a car, and probably regarded as a jewel of national industry by some. And you put that into overdrive and made of its name an overcharged libidinal object, denoting both hypnotic states and the possibility of violent abduction. A lot of things seem to work like this in the novel.
DC: Oh yes, all of this has been carefully researched. The graphing that I had to do beforehand was pretty intricate, in order for almost everything in the book to resemble and turn into everything else. It's supposed to be this language that is secretly manipulating you. The structure has a little bit of a relationship to *God Jr.* (2005)[23] and what happens in the last chapter when everything wilts into the game. But the book is mainly my attempt at trying to write in a language that wasn't mine.
OS: What about the way all of this affected yours and Zac Farley's cinematic language? There's very little sadism in *Like Cattle Towards Glow* (2015) and *Permanent Green Light* (2019).

DC: There's a tiny bit, but it's more something like a myopic hunger than anything else. I'm not interested in sadism for the sake of itself at all, and just saw Sade as a formal device. I see it clinically: if you use something that seems sadistic, what does that facilitate in terms of making things happen?
OS: If we go back to your George Miles Cycle[24] now: I was also thinking of this moment in *Frisk* (1991), when the Dennis character meets Pierre, the hustler. And Dennis confesses his fantasies of hyper-violence to him. As a reader you're first horrified, but then you go on, and it seems that the fantasies themselves crumble almost irremediably, and that the rest of the cycle is dedicated to putting these bits back together in some way.
DC: Yes, again one of the things is that the cycle is one body that devolves or whatever: each of the books pertains to the same body but the damage that is enacted then impacts the form in the second one, and then there's a recovery and it goes on. So that there's almost nothing left in *Period* (2000). So that's happening, and it's happening in the way you say, too. It's kind of… There's a damage that's done to the novel beyond the form. The five books are one universe, even though you can read them separately. So at some point I had to work with what had been revealed, and try to reconstruct it or something. But my friend George Miles didn't go through what his avatars in the book go through, the resemblance being mostly physical and emotional. The whole cycle stands as an homage to him, even though I thought he was alive and it turned out he was dead the whole time.
OS: It wasn't a matter of getting him out of your system?
DC: No… Because I had explained to him how I intended to do it as much as I could at that point, three or four years before I finished the first novel. And I wrote it for him to read, and I assumed at that point that we would continue to be friends. So it wasn't like that. It was an homage to him because he was a person who was brilliant but had terrible, terrible chemical imbalances, which killed him eventually. So there was this dimension of making his presence in the world, and I knew that he would never be able to do it by himself because he was too fucked up. And then it was also a… a way for me to… to protect myself against the possibility of becoming sadistic. Because he is the boy; he is the mind that changes into other characters. It's always him, and I would never really become sadistic to him, even in the context of fiction there would eventually be something to counter that.

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Until the very last paragraph of *Period*, a monotone will-o'-the-wisp that prowls in the debris of the text, the George Miles Cycle strikes me as a complex proof of love. An open question remains, inspired by Cooper's heuristics, and which, to my mind, echoes Foucault's question: what does sadism make possible in cinematic narration?
Some years ago, Moira Weigel indicated the possibility of theorizing a transition between the European "New Waves" and what she calls "sadomodernism,"[25] or to put it less succinctly, the cinematic exploration of sadistic traits through the aesthetic codes of modernism. She sees sadomodernism culminating in the films of Michael Haneke and Lars von Trier. In Haneke's films, Weigel argues, the characteristic of this sadistic strain of modernism is a radical forcing of the viewer's moral autonomy (*Selbständigkeit*). In this sense, Haneke would be producing a very particular version of the Kant/Sade relationship, with unpleasure as an imperative of reception and with the goal being to wrest filmmaking from the form of storytelling that Nazi, Soviet, and American imperialist ideologies have imprinted on it.

Still from Michael Haneke's *Funny Games* (1997)

To turn my attention here, as Weigel does, to Haneke, and to the apex of his sadomodernism: very few films have done quite as much as *Funny Games* (1997) in rendering explicit the affect of cruelty in the representation of violence in movies. The banality of gore is eclipsed by the protraction of psychological suffering portrayed in the film. *Funny Games* offers thereby the precipitate of a form of white terror that an

experienced eye alone can detect from the very first minutes: the violence of a slowed-down and misplaced slapstick routine, a priori unqualifiable as a perverse prelude to torture. The social bond of the two protagonists is thus reduced to an overtly criminal variant of the bond existing between two of the most prominent little shits of pop culture: Beavis and Butt-Head.

Haneke's fascination for the Van Eyck brothers' *Adoration of the Mystic Lamb* (1432) has been said to have led him to seek to recreate the lost Hell of this altarpiece by other means. But reducing his work to a biographical trigger amounts precisely to reintroducing too much mystique into the analysis. What he is often doing is registering the fact of the mass representation of violence, and trying to unfold all its consequences in his apparatus (and thereby to forge a cinematic purgatory fitted to the repressions of the democratic life of Europeans). When I say together with Weigel that there is a sadistic strain in Haneke's modernism, I don't mean to say that all he did was devise a cruel game. More clearly, beyond the sadistic traits of his movies, Haneke invents a syntax, meant to represent violence inside the very industry that derealized it.

At this point, we could ask what in sadomodernism is most figuratively Sadeian. If Haneke or von Trier are not relying on the Sadeian text, the specter of BDSM, which has become a standard object of cultural industry, sometimes haunts their images: it is to a certain extent present in Haneke's *The Piano Teacher* (2001) and more clearly in von Trier's *Nymphomaniac* (2013). But BDSM does not appear there fully in the way it is most often experienced—namely, as a culture of consent and play, permitting among other things to make the symbolic mandates that organize sexuality more explicit.[26] After his stay in California, Foucault himself saw it as an eroticization of power, in which a quasi-utopic fluidity of roles can exist.[27]

Still from Michael Haneke's *Amour* (2012)

Beyond this, what remains of sadomodernism today? In Haneke's cinema, *The White Ribbon* (2009) responds almost exactly to Barthes' concern about *Salò*: that of not showing fascism by analogy, but showing instead how it comes to be. More crucially, in *Amour* (2012), violence is almost completely gone. Hints thereof are present here and there, but they are illusory and practically taken to a point of self-derision. His syntax has not been completely dismantled but it is put to other uses (in this case, depicting the complexity of conjugal love in the anticipation of mourning). In von Trier's work, reflection seems to have given way to a combinatorics of cruelty gone overboard, exclusively addressed to the professional subjects of critique.

As far as Sade's writings are concerned, they still allow us to see literature as a contagious reservoir of fantasies by the slowest of means. In the field of cinema, a faster means, these writings seem to have been subject by and large to the unreflective autonomization of what Barthes called their "vulgar" contents—namely, sadism.[28] It may very well be through such an autonomization that a lowbrow Machiavellianism has reproduced itself in sensibility,[29] which we ended up believing was our final word on the complexity of desire.

Translated from the French by Gila Walker, revised by the author.

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Footnotes

1. Michel Foucault. “Sade, Sergeant of Sex.” *Essential Works*, vol. 2, New Press, 1988, pp. 223–227.

2. Foucault, p. 226.

3. Pier Paolo Pasolini. *Scritti corsari*. Garzanti, 1975.

4. Michel Foucault. “The Gray Mornings of Tolerance.” *Essential Works*, vol. 2, New Press, 1988, pp. 229–231.

5. Georges Bataille. “The Psychological Structure of Fascism.” *Visions of Excess: Selected Writings 1927–1939*, University of Minnesota Press, 1985.

6. Klaus Theweleit. *Male Fantasies, Volume 1: Women, Flood, Bodies, History*. Translated by David Conway, Erica Carter, & Chris Turner, University of Minnesota Press, 1987; *Volume 2: Male Bodies. Psychoanalyzing the White Terror*, University of Minnesota Press, 1989.

7. Theweleit, *Male Fantasies*, Vol. 1, p. 361.

8. Theweleit, *Male Fantasies*, Vol. 2, p. 307.

9. Roland Barthes. “Sade-Pasolini.” *Stanford Italian Review,* special issue “Pier Paolo Pasolini: The Poetics of Heresy,” edited by Beverly Allen, II:2, Fall 1982, pp. 100–102. Translation modified.

10. For a succinct inventory of Francophone Sadology, see Alain Fleischer. *Sade, scénario*. Le Cherche-Midi, 2013.

11. Pierre Klossowski. “The Decomposition of the Theocratic Feudal Order and the Birth of Aristocratic Individualism.” *Sade, My Neighbor*, Northwestern University Press, 1991.

12. Alexandre Matheron, “Spinoza et la décomposition de la politique thomiste. Machiavélisme et utopie.” *Études sur Spinoza et les philosophies de l’âge classique*, ENS éditions, 2011.

13. Theodor Adorno and Max Horkheimer. “Juliette or Enlightenment and Morality.” *Dialectic of Enlightenment*, translated by Edmund Jephcott, Stanford University Press, 2002, pp. 63–93.

14. This is one of the propositions that led me to engage in a systematic reading of the prison writings of Antonio Negri, in a book that I hope to publish soon.

15. On this subject, see Manuele Gragnolati and Christoph F.E. Holzhey. “Active Passivity? Spinoza in Pasolini’s *Porcile*.” *World Picture*, no. 10, 2015.

16. From Samo Tomšič, see *The Capitalist Unconscious. Marx and Lacan*. Verso, 2015; *The Labour of Enjoyment. Towards a Critique of Libidinal Economy.* August Verlag, 2019.

17. On the Typic of pure practical reason, see Adam Westra. *The Typic in Kant’s* Critique of Practical Reason*. Moral Judgment and Symbolic Representation*, Kantstudien-Ergänzungshefte, vol. 188. Edited by Manfred Baum, Bernd Dörflinger, and Heiner Klemme, De Gruyter, 2016.

18. Jacques Lacan. “Kant with Sade.” *October* 51, translated by James B. Swenson (1989), pp. 55–75.

19. Michel Foucault. *The History of Sexuality*. Translated by Robert Hurley. Random House, 1978, p. 56.

20. Foucault, *The History of Sexuality*, p. 92.

21. Foucault, *The History of Sexuality*, p. 89.

22. Dennis Cooper. *The Marbled Swarm*. Harper Perennial, 2011.

23. Dennis Cooper. *God Jr.* Grove Press, 2005.

24. The George Miles Cycle consists of five novels: *Closer*. Grove Press, 1989; *Frisk*. Grove Press, 1991; *Try*. Grove Press, 1994; *Guide*. Grove Press, 1997; *Period*. Grove Press, 2000.

25. Moira Weigel. "Sadomodernism." *n+1*, issue 16, Spring 2013.

26. See for instance Reba Maybury. *Dining With Humpty-Dumpty*. Wet Satin Press, 2018.

27. See David Macey. *The Lives of Michel Foucault*. Verso, 2019.

28. Roland Barthes. *Sade, Fourier, Loyola*. Translated by Richard Miller, University of California Press, 1989, p. 70.

29. On related issues, see China Miéville. "On Social Sadism." *Salvage*, issue 2: Awaiting the Furies, November 2015.

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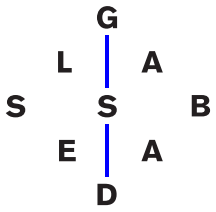

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Freedom and Fiction

Patricia Reed

> *"The fundamental codes of a culture—those governing its language, its schemas of perception, its exchanges, its techniques, its values, the hierarchy of its practices—establish for every man, from the very first, the empirical orders with which he will be dealing and within which he will be at home."*[1]

The 'home' to which Foucault refers in *The Order of Things* from the epithet is a discursive one. It is an historical, or epochal home, yet is no less 'domestic' just because it is a deprivatized one. This historical-discursive home operates as a taming schematic for "the wild profusion of existing things"; it is the given space of order anterior to "words, perceptions, and gestures", which are "more or less happy" expressions of that particular order; it is a space "more solid, more archaic, less dubious and always more 'true' than the theories that attempt to give those expressions explicit form."[2] The 'home' of which Foucault speaks is the a priori mode of being structuring the spontaneous cultural experience of the relations between things, the taxonomies for those relations (the organization of sameness and difference), and the principles by which these taxonomies must be considered.[3] This 'home' is the naturalization of an order as a code governing how the world is navigated (as well as how it ought to be navigated with prescriptive, normative weighting), and the ways in which knowledge of those codes is arranged and invented. The term he attributes to such a periodic domus is the *episteme* — from the Greek word meaning "knowledge, acquaintance with (something), experience", itself derived from the Ionic Greek *epistasthai*, *epi* (over) and *histasthai* (to stand or to place).

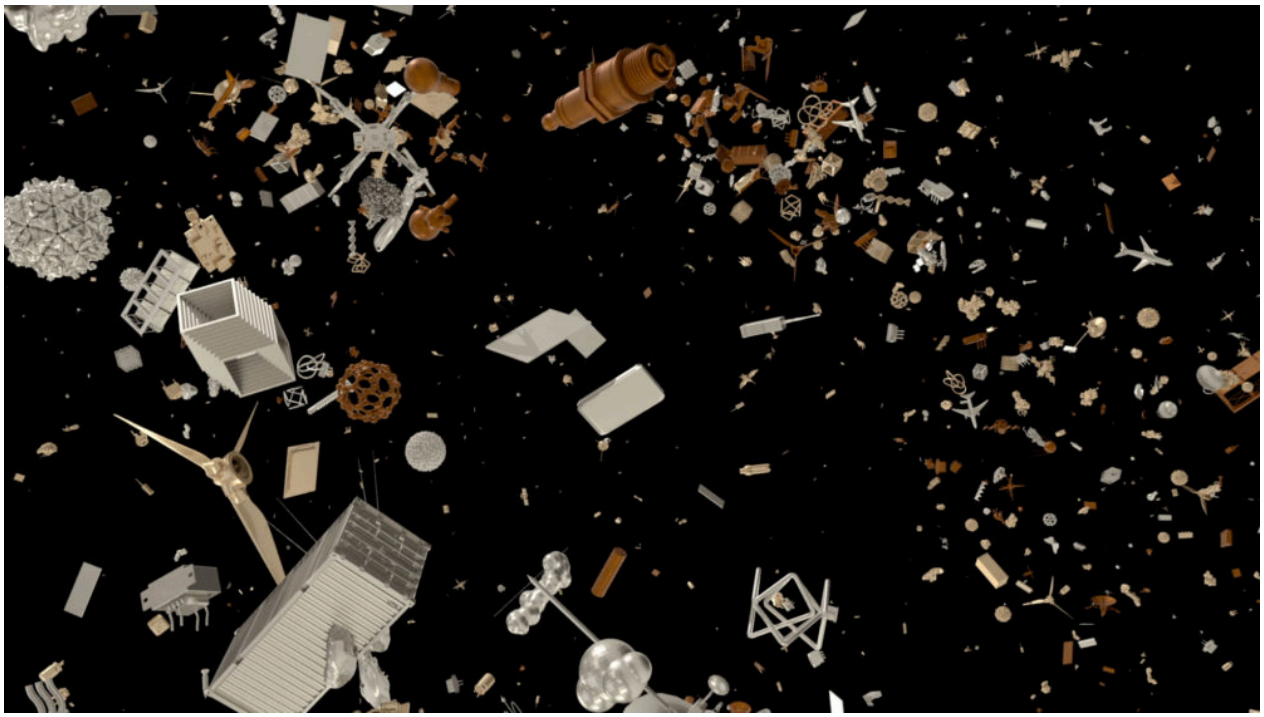
The episteme is less concerned with the history of knowledge, but rather with the field conditions that enable and shape knowledge in a specific way; as that which "determine[s] the rules of formation of concepts, theories, objects of study."[4] It is the site upon which knowledge is positively grounded, and one that lends underlying coherence to the identifiability of historical eras (like the Classical and Modern period).[5] The 'domesticity' implied by the episteme is not the construction of a fixed enclosure, but is the foundational space undergirding the construction of certain structures of knowledge, determining what is possible and impossible to think, what is relevant and irrelevant to question. Although one can tinker with the arrangement of things within a given episteme and a degree of surface change can be experienced, paradigmatic transformation happens at the level of the site from which the construction of thought is primarily referenced. It is due to this critical influence of the site in ordering the conditions of possibility for knowledge that Foucault argues for an archaeological, or discursive, excavation to better fathom these root conditions of positivity. As the relationship between thought and culture, the episteme outlines an alternative genealogy that no longer foregrounds the linear progress of knowledge, but one that accounts for discontinuities, insofar as there are historical moments where it is simply no longer possible to think a certain thought, or engage in the practice of reasoning in the same way.[6] Foucault asks why these possibilities and impossibilities come into being, by attempting to grasp "the implicit systems which determine our most familiar behaviour … to show their formation, the constraint they impose upon us", and, in so doing, attempt to place oneself "at a distance" from them, "to show how one could escape."[7]

zach Blas. *Facial Weaponization Communiqué: Fag Face*, 2012. HD video, Courtesy of the Artist.

Sylvia Wynter notably extrapolated upon the episteme, tethering its principles to human-conception itself, drawing an important link between the ways the human has been culturally/historically understood and the creation of knowledge regimes that reflect the 'nature' of that self-conception. Because of this relation, Wynter stresses that any substantial social transformation necessarily requires a paradigm shift in the discursive, conceptual framework through which a certain concept of being human is devised and practiced.[8] In what Wynter eloquently names as "genres of being human," this idealized human figuration operates like a template for human forms and sets of 'proper' activities, an idealization whose modes of reproduction are bolstered by social organizational structures incentivizing adaptation to this idealized concept. This positive feedback loop, or what she (following Frantz Fanon) calls the sociogenic principle[9], effectively naturalizes a particular model of human idealization, whilst othering all beings and entities not in conformance with its ontologizing and domesticating force. Just as the discursive ground of the episteme, this human idealization is assumed as an immutable given, a sacrosanct site of positivity for human self-reference weighting knowledge claims in accordance with the 'natural fact' of that human concept-template—a habit of thought she identifies as "genre-specific orders of truth."[10] Due to this adaptive, genre-*conforming* / genre-*confirming* 'truth' process, Wynter (self-)critically notes the role intellectuals play in replicating these genre-specific orders

of truth (as opposed to the pursuit of truth in general). Most explicitly, this can be found in her open letter entitled "No Humans Involved," where she recounts the complicity of academia in contributing to the corroboration of "inner-eyes" (given human-concept taxonomies) through which reality is not just seen, but evaluated, narrated, sorted, and framed, most often to the dismissal or blind ignorance of "liminal" beings (and entities) not fitting with, or performing within the template of the idealized human genre-concept.[11] Whether the human genre-concept precedes the episteme, or the episteme engenders a human self-conception in its likeness, both are engines of socio-*epistemic* historical reproduction. Both are regionally specific and operationally pertain to every human culture, according to Wynter,[12] functioning as a primary frame of reference for thinking the world, and deriving knowledge orders in their image that determine what is understood as legitimate, good, true, natural, relevant, or necessary. Geopolitical domination is enacted through this self-reinforcing, reproductive mechanism when the regional-specificity of a particular episteme/human-concept is inflated and imposed extra-regionally, in material and conceptual ways—this is a succinct account of unilateral globalization.[13] It is through the inflated expansion of a regionally-specific episteme where the human has been ontologized by an ever-persistent, subsuming 19th Century European human-concept (or Man2, in the parlance of Wynter), that this globalization implies such a liberal monohumanism, whose paradigmatic figure is the *homo oeconomicus*. Such an inflated genre of being human has generated "the lived and racialized categories of the rational and irrational [the gendered as well], the selected and the dysselected, the haves and the have-nots as asymmetrical naturalized racial-sexual human groupings that are … increasingly subordinated to a figure that thrives on accumulation."[14] Today this monohumanist-human figure domesticates at a total scale, placing non-conforming (or non-performing) bodies or entities, conceptually, politically, and socially, outside the enclosure of a referent 'we' of humanity—a particular 'we' in accordance with idealized human genre-concept that has become naturalized as a generic whole, when in practice, this 'we' is nothing more than the reinforcement of an adaptive truth in accordance with a particular genre of being human. The perilous blind spot is not simply that this 'we' is partial, but because that regionally specific, referent 'we' is treated as isomorphic with the entirety human species.[15] Such is the a-historical monohumanist 'we' of the anthropos in the Anthropocene. Wynter notes that as post-nuclear creatures now faced with climate crisis, for the first time in history humankind is confronted with a common environment, even when in drastically different degrees of acuteness in crisis. It is a

confrontation demanding the invention of new genres of being human, or modes of self-troping commensurate with it[16]—ones made to the measure of the planetary.[17] The question is, how can genres of human self-troping made to the measure of the planetary not simply reiterate the inflationary template of the monohumanist-human, that catalytic idealization responsible for the very production of this now common environment?



Video still from cinema trailer for "1948 Unbound: Unleashing the Technical Present" event, organized by Haus der Kulturen der Welt, Berlin 2017, by Patricia Reed and Harry Sanderson.

Constructing Historical Incompletion

To excavate the episteme (as well as its specific human-concept) is to understand the naturalization of thought's possibility and the space of assumptions, in order to break with those (particular) constraining habits towards the construction of historical discontinuity. Engaging with the question of history, or more precisely "what it means to have a history" in the words of Reza Negarestani, is to labor for its detotalization, to labor against the perception of inevitability, to cognize its incompletion by liberating it from the mere acknowledgement of inventoried events (like monumentalization), and to repurpose it for pathways unseen by the past.[18] Such repurposing of history is dependent on making it intelligible to cognition,[19] especially those histories that have been deliberately excluded from even the most superficial nod of recognition. The

intelligibility of history, that is, the experience of a "content-awareness of the activities, judgments, decisions, conflicts, values, and variables"[20] that have led to a current world configuration, as Negarestani writes, require modes of representing a reconstruction of this history (an amalgam of "technoscience, economy, politics, ethics and social struggle") to a cognizing agent.[21] The activity of making this episteme intelligible is an essential procedure in perceiving contingency and actualizing possibility within a seemingly closed system of positivity constitutive of existing epistemic givenness. It is due to this necessary experience of historical reconstruction (to reiterate, not monumentalization), that a vigilance against a-historicity is required, both at the conceptual scale and through the very tools and techniques that are used to reason the world. A-historicizing tools for "seeing, naming and knowing" the world, exemplified by Nora Khan's observation as to the emptying-out of human model-bodies in simulation spaces, reinforces a false neutrality across the spectrum of differential human experience.[22] A perception of technologically-backed, detached neutrality and uniformity that only passes as 'neutral' because it is an adaptive truth expression of the episteme (and its ontologized human-genre) in which it is embedded.

To recall, for Foucault, the generalized site of historical conditioning serves as an anterior constraint for knowledge, where emancipation from its modes of determining possibility comes by way of placing oneself 'at a distance' in order to escape from its a priori domesticating constraints. To be clear, this is not to suggest an ambition for a constraint-free, anything-goes form of thought—in fact, the conflation of personal opinion as truth has become an adaptive expression of an episteme privileging individualism as such; it is a question, rather, of what configuration of constraints ought to be actualized. The dilemma is, how can this 'necessary distance' be achieved while being enmeshed, both materially and cognitively within a given episteme? How does the picture of the archaeologist who digs deep into a site, who is deeply situated, correlate with the 'necessity of distancing'? Is this idea of 'distancing' (inherent to conventions of critique) a viable vehicle, and if not, by what procedures can the episteme be made intelligible and amenable to new historical weighting?

From the perspective of Donna Haraway's situated knowledges, the very principle of seeking distance as a mode of objective knowing only plays into the 'god's eye' myth, since it is figured as disembodied, without location, without a politics—a myth, she was keen to point out, that is only believed by "non-scientists and a few very trusting philosophers."[23] Hers, rather, is a conscious positioning of thought. Haraway's situated knowledge is an embodied, feminist *ethico-politico* epistemology driven by an underlying

premise that building better accounts of reality is bound to the conscious locatability of knowing agents, specifically, their particular material, social, and geo-historical circumstance shaping knowledge practices (in both propositional and tacit forms). These situated knowledge claims, as Haraway's thesis goes, work reciprocally to engender a better accountability to and within reality (politics and ethics). Calling for a mode of 'partial objectivity,' situated knowledge lays the groundwork for an embodied/locatable objectivity that is simultaneously an account of the "radical historical contingency for all knowledge claims and knowing subjects … for recognizing our own 'semiotic technologies' for making meanings and a no-nonsense commitment to faithful accounts of a 'real' world."[24] Notable (and less discussed) in her essay, is the recuperation of the "maligned sensory system" of vision, urging for an embodied seeing against the "conquering gaze" from nowhere, the gaze that has the power to inscribe "marked bodies," while making an "unmarked claim"; possessing the power to "represent while escaping representation."[25] Making claims on vision from a situated perspective, is required, according to Haraway, in order to become "answerable for what we learn how to see," where the fight over what is even adjudicated as rational knowledge is equal to a struggle over "*how* to see."[26] It is crucial to highlight that partial objectivity is not an instance nor a plea for epistemic relativism, which she explicitly condemns as the "mirror twin" of totalized vision mythologies, since by claiming to be everywhere there is a disavowal of the "stakes in location, embodiment, and partial perspective" and, as a result, we make claims that can be located, specifically, nowhere.[27] For Haraway there is no ambition to separate politics and ethics from epistemological endeavors—there is no detached innocence to be had—and that partial objectivity is where the "possibility of sustained, rational, objective inquiry rests" through the weaving together of particular, locatable knowledges, in "webs of connection called solidarity in politics and shared conversations in epistemology."[28]

While there are several open questions that arise in Haraway's proposition of partial objectivity demanding scrutiny, what is essential to uphold is threefold: 1) the grappling with knowledge claims as inseparable from their ramification in reality (the non-innocent materialization of knowledge in practice, in situ, both politically and ethically); 2) the inseparability between accounts of reality and accountability to it, that is, accountability to its possible (incomplete) histories; and 3) the insistence on 'betterment' (on change) for both accounts *of,* and accountability *to* reality. What is left unmodeled, however, by partial objectivity is *how* these webs of connection across situated knowledges cohere as a shared, and therefore generalized "faithful" account of

reality towards betterment (demanding more rigor than a 'shared conversation'). And reciprocally, how do those shared, generalized accounts of reality impact and affect the positioning of situatedness as such? If there is fidelity to the site from which partial knowledge claims are made, how does this not end up reproducing the epistemic constraints domesticating thought's possibility? In other words, how are we to distinguish between adaptive truths in accordance with the discursive site of the episteme, versus truths in general?[29] Lastly, and crucially, if partial objectivity is concerned with better accounts of the world in order to be better accountable to it, how can it think other, better worlds that are not locatable, nor actualized in the here and now, for which there is presumably no actualized site? How is a vision of them to be positioned as part of a reasoned struggle for new historical-discursive configurations?

Situational Relocation

Positioning, within situated knowledge, is not immobile. This point needs to be stressed if an elaboration of situatedness is not to fall into the facile trap of equating immediate experience with knowledge; of monumentalizing the site as permanent, nor of the mere reproduction of adaptive truths that reinforce historical-discursive closure. Situatedness does not denote a fixity of place, materially or cognitively. Through a Spinozist lens (notable because of its strong entanglements between rationality, affects, and ethics) committing to the mobility of positioning in an accountable way means that it is never "sufficient to rest any explanation of experience, knowledge or power on the sheer fact that it is given."[30] As Rocco Gangle writes, "[O]ne always begins with what is given, but … philosophy fails to think adequately if the given functions for it as an answer and not solely as a relative starting-point."[31] This is the unavoidable plight of all thought: that it begins from a given situation, that it must begin from some location, from some body or entity, even when, through thinking itself, positional relocation is enabled. While there is no desire to associate relativity with epistemology, the departure of thought is indissociable from a relative environmental departing situation. In arguing against unsituated thought, since reasoning can never be modeled as a perfectly smooth, disembodied, rational, rule-following system, Anil Bawa-Cavia writes that reason, rather, operates "as a plastic ensemble of self-referential *representings*, flawed and incomplete *picturings* of an environment put into ever-novel syntactic, semantic, and logical relations."[32] Bawa-Cavia's framing of situatedness (one that pointedly critiques a humanist self-concept possessing a monopoly on intelligence) focuses less on the positioning question (as with Haraway, whose theory bends more towards the ethical

than the epistemic), but highlights situatedness as an embodied opportunity for interaction, and thus as a model for learning. Due to the emergence of incalculable interactions among agents, including their compounded effects that feed back into the interactive dynamics of the situation over time, the situation, as it were, always contains the seeds of its own excess.[33]

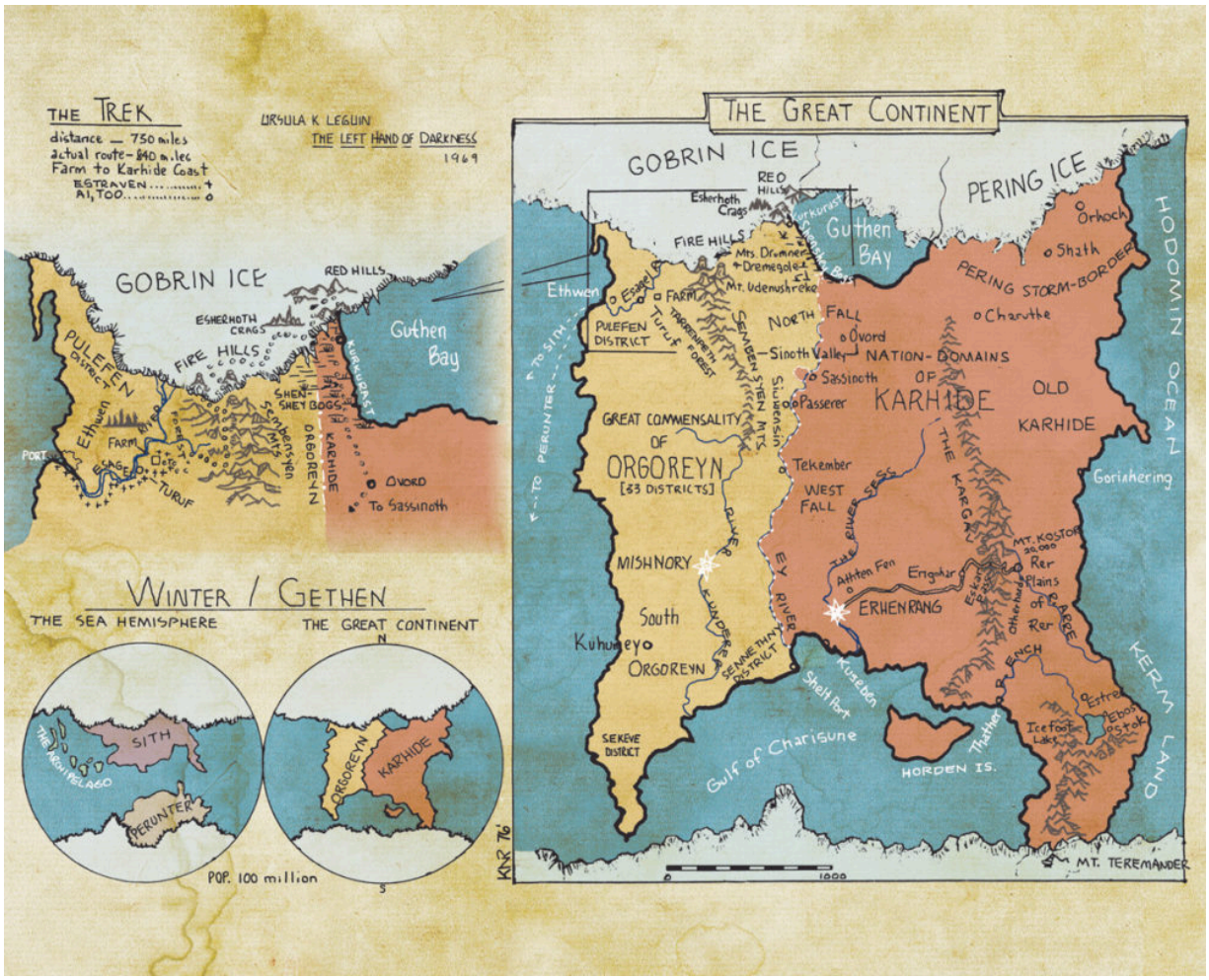
Situatedness, in this view, is best described as an ongoing continuum of positioning and interaction, where the excessive possibility of a given site is rendered intelligible via interaction, creating an affordance for repositioning in excess of a given site. This positioning-interaction continuum allows for more accountability in both epistemic (reasoned cognitive mobility) and ethical terms (grappling with the ramifications of repositioning). In terms of the epistemic 'site' and the constraints endemic to it (as a broad historical situation), the possibility for its 'escape,' the possibility for its historical repurposing, is not contingent on the discovery of novelty wholly external or alien to it. The possibility of its escape, for the invention of historical discontinuity, in other words, a new site in excess of, and different to the existing one, can be cultivated at the level of situated interactions. The situation in excess of a given episteme, is equal to the construction of new grounds upon which to base the positivity of knowledge, but its novel construction of an elsewhere, of a 'site' unfamiliar to it, is a consequence of situated interaction that generates new positions from which to see.

Inviting Excess

It would be disingenuous to suggest that all modes of situated interaction are equally consequential. Through what tools and techniques can these situated interactions participate in the engineering of a site that is alien to its given situation? Such a problem belongs to the domain of counterfactuals, understood as "*an invitation* to consider what goes on in a selected 'counterfactual situation'; which is to say, at some other possible world."[34] Counterfactuals raise at least two fundamental questions. On an epistemic level, how can experiences of the given here and now, that is, in a given actualized world, justify speculations on unactualized possibilities; and on a semantic level, how do we reason and discursively interact with these unactualized possibilities?[35]

Counterfactuals provide a cognitive play-space to engage with, and potentially navigate unknown worlds, where Ruth Byrne has argued that the imagination required for modelling these other worlds is rational, insofar as counterfactual alternatives are constructed by conceptually toying with or mentally adjusting facts or (perceived) given truths within a representational picture of reality.[36] The proposition here is that

catalyzing the rational imagination of other worlds, of inciting counterfactual invitations, comes by way of fiction, comes by way of falsity, comes by way of idealization. Fictions, falsity, and idealization are understood broadly, not as that belonging exclusively to the domain of literature or the arts in general, but also as necessary inventions within the sciences as well, in the way they operate as cognitive organons for modelling truths unbound by the inductive constraints of what is currently known (or what is thought to be known). David K. Lewis writes that "[i]dealizations are unactualized things to which it is useful to compare actual things,"[37] and it is through counterfactual contemplation that such idealizations can be consequentially reasoned, where fictions can be imaginatively ramified. Because these fictions or idealizations are not constrained absolutely by the givenness of an actualized world, the imaginative truths they can generate, what they can help make intelligible, are unbound to merely adaptive, genre-conforming expressions of the world as it currently, historically, and empirically is. They are non-adaptive truths in excess of the given, actualized site of the episteme, ideal-truths that fold into the situated world of interactive, social thought as new referential pictures and novel vistas shaping not only what is seen, but how to see otherwise.



Ursula K. Le Guin's hand-drawn map of Gethen, the planet that serves as the setting for her *The Left Hand of Darkness*. Copyright: Ursula K. Le Guin Literary Trust.

It is no coincidence that Foucault prefaced the episteme concept through a personal, anecdotal account of an encounter with fiction. Specifically, a Borgesian fable listing a taxonomy schematic for animals that was so hilariously bizarre to Foucault that it invited/incited him to consider what it was about the schematic, or that mode of ordering, that was impossible for him to think in the same way. The fictional invitation made the contingency of primary, discursive ordering schemes intelligible, creating an opening for archaeological scrutiny where before, this primary order was simply a silently given fact upon which knowledge must be based. It is equally of no coincidence that Wynter emphasizes the (sociogenic) force of idealization in the human self-concept and the urgency to make claims on the hybrid bio/mythical status of the human. For a genre of being human made to the measure of the planetary, she demands an intervention into the story that humans are purely biological creatures "motivated primarily by the imperative common to all organic species of securing the material basis of their

existence; rather than by the imperative of securing the overall conditions of existence."[38] Without this epistemic fiction, without this conceptual self-storytelling there is simply no *homo oeconomicus* to be self-troped into actuality. For Foucault, fiction catalyzed a certain intelligibility of the given historical discursive schematic; for Wynter, it is the fiction of the human self-concept that ushers in, and produces the actuality of certain social configurations, ones that incentivize adaption to that idealized human genre-concept. Fictions and idealizations are not innocent, nor neutral operators—whether they are used as vehicles for making something intelligible, like infinite populations that make evolutionary processes more understandable, or as models that directly intervene in material reality, like a financial prototype. Fictions have consequences—materially, politically, ethically, and epistemically—which is precisely why the need for accountability to them is crucial. And yet because, when invented, they do not yet shape reality—perhaps they may not yet even pertain to reality, thinking through their ramifications can only be situated in a counterfactual world, that is, in an excessive site.

Hosting Unactuality

If there is to be an escape from the current episteme, a powerfully dominant and inflated historical-discursive 'home,' one that has constrained possibilities for thinking otherworldly configurations, it is indispensable but not sufficient to simply account for reality, to simply account for what is given. Being accountable to the crises of this historical present demands the intervening potency of fiction, of counterfactually situated and ramified fictions that can make the possibility for another history intelligible, fictions that reveal the incompletion of history. It is not enough to rearrange the furniture in this current historical discursive home; freedom from this given domestic situation and the modes of domestication that conform to its logic, is dependent on the freedom to construct comparative fictions that serve as tools for building a new home from the foundation up, for new sites of positivity upon which thought and activity are based. The desire for betterment is itself entangled with fiction; since the better is always unactualized in the here and now, the better is not empirically available to direct experience. Accounting only for the here and now of what is given to localized experience and thinkability is to foreclose on the imaginative possibility of situated betterment. Betterment always belongs to an otherworld, another site, another situation, and it is through fiction where a counterfactual imagination of that possible world is enabled. This fiction of betterment is inherently risky, as Negarestani writes,

since its actualization entails a "homewrecking" operation.[39] Yet this destructive implication is only one side of the equation, since the affirmation of this negation necessitates the reasoning of new pathways for 'home' invention, for world-building that become intelligible once the given historical site grounding the space of possibility is understood as incomplete, unfinished, and non-total. There is joy along these new pathways, as Alexander Grothendieck wrote, in the creation and giving shape to "tools, utensils, furniture and required instruments, not only for building the house from the foundation all the way up to the top, but also for copiously filling in future kitchens and future workshops, and furnishing the home to be able to live in it comfortably."[40] The fictions of betterment that can guide, shape, and weight co-existence for an otherworld, for an unactualized site, for the possibility of a new history are pressing, if there is to be an opportunity to co-exist well within a planetary-measured environment. When much of humanity, not to mention non-humanity today is under direct existential threat from the consequences of the inflated 'home' of this particular historical episteme—one that in practice leaves millions homeless, metaphorically, literally and socially—there is little hope in the reproductive quality of adaptive truths to answer to a catastrophe made in the name of its discursive constraints and resulting normative commitments. *Accounting for* unactualized historical-discursive sites requires freedom from such adaptive truths that not only reinforce existing frames of reference, but participate in the perception of their immutability. *Accountability to* such possible sites of epistemic enablement—ones in excess of what is situationally given or conceived of in the here and now, an always risky proposition—necessitate a conceptual play-space, an imaginative testing-ground contingent on the freedom to construct fictions as vehicles to interact with its otherworldly situation of historical enablement.

Footnotes

1. Michel Foucault. *The Order of Things: An Archaeology of Human Sciences*. Routledge, 2005, p. xxii.

2. Foucault, p. xxiii.

3. Foucault, p. xxvi.

4. David Scott. Preface to "The Re-Enchantment of Humanism: An Interview with Sylvia Wynter." *Small Axe,* vol. 8, 2000, pp. 119–207. Available online here.

5. Foucault, p. xxiii.

6. Foucault, p. 56.

7. John K. Simon. “A Conversation with Michel Foucault.” *Partisan Review,* no. 38, 1971, pp. 192–201.

8. Sylvia Wynter. “A Ceremony Must Be Found: After Humanism.” *Boundary 2*, vol. 12, 1984, pp. 19–70.

9. Sylvia Wynter. “Towards the Sociogenic Principle: Fanon, The Puzzle of Conscious Experience, of ‘Identity’ and What It’s Like to be ‘Black.’” *National Identities and Socio-political Changes in Latin America*, edited by M. F. Durán-Cogan and A. Gómez-Moriana, Routledge, 2001, pp. 30–66.

10. Sylvia Wynter and Katherine McKittrick. “Unparalleled Catastrophe for our Species.” *Sylvia Wynter: Being Human as Praxis*, edited by K. McKittrick, Duke University Press, 2015, p. 32.

11. Sylvia Wynter. “No Humans Involved: An Open Letter to My Colleagues.” *Forum N.H.I.: Knowledge for the 21st Century*, vol. 1: Knowledge on Trial, 1994, pp. 42–70. This essay-letter was written in the wake of the Los Angeles riots in 1992, subsequent to the acquittal of L.A.P.D. officers captured explicitly on video violently beating Rodney King.

12. Derrick White. “Black Metamorphosis: A Prelude to Sylvia Wynter’s Theory of the Human.” *CRL James Journal*, vol. 16, 2010, pp. 127–148.

13. Yuk Hui. “Cosmotechnics as Cosmopolitics.” *e-flux Journal* #86, nov. 2017. See here.

14. Wynter and McKittrick, p. 10.

15. Wynter and McKittrick, p. 24.

16. Wynter, “A Ceremony Must Be Found: After Humanism.”

17. Scott, pp. 119–207.

18. Reza Negarestani. *Intelligence and Spirit*. Sequence Press, 2018, p. 491.

19. Negarestani, p. 63.

20. Negarestani, p. 63.

21. Negarestani, p. 491.

22. Nora Khan. “Seeing, Naming, Knowing.” *The Brooklyn Rail*, 07 March 2019. See here.

23. Donna Haraway. “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.” in *Feminist Studies*, vol. 14, no. 3., 1988, pp. 575–599.

24. Haraway.

25. Haraway.

26. Haraway.

27. Haraway.

28. Haraway.

29. Wynter and McKittrick, p. 32. The term “adaptive truth” is borrowed from Katherine McKittrick’s introduction in the same volume: “Yours in the Intellectual Struggle: Sylvia Wynter and the Realization of the Living,” pp. 1–8.

30. Rocco Gangle. *Diagrammatic Immanence: Category Theory and Philosophy*. EUP, 2016, p. 20.

31. Gangle.

32. Anil Bawa-Cavia. “The Inclosure of Reason.” *Technosphere Magazine*, 2017. See here.

33. Bawa-Cavia.

34. David K. Lewis. *On the Plurality of Worlds*. Blackwell, 1986, p. 22. [Emphasis by the author].

35. William Starr. “Counterfactuals.” *The Stanford Encyclopedia of Philosophy,* Spring 2019, edited by Edward N. Zalta. See here.

36. Ruth M. J. Byrne. *The Rational Imagination: How People Create Alternatives to Reality*. MIT Press, 2005, p. 3.

37. David K. Lewis, *On the Plurality of Worlds*, p. 28.

38. Wynter, “No Humans Involved,” p. 49.

39. Negarestani, p. 487.

40. Alexander Grothendieck. *Récoltes et Semailles*. Translated by Roy Lisker. Université Montpellier, 1986. Part I available online here.

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Marcel Duchamp's Diagrammatics of Love, Sex and Erotics

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Not to put too fine a point on it, almost all of Marcel Duchamp's artworks from around 1900 onwards are centered around love, sex, and erotics: penetrations of various kinds, rhythmic pulsations, and sexuality and gender relations in respect of sexual activity or sexual longing. It is also well known that many of these works take as their character, at first glance, an almost schoolyard type of humor in this respect—*L.H.O.O.Q.* (1919) being a prime example.[1] However, aside from the often funny or glib smutty façade of some of Duchamp's works, his engagement with erotics and diagrammatics can be explored to elicit a truly strange, fascinating, and surprising dialectical methodology of rationalizing what in love, sex, and erotics are the most seemingly irrational of human experiences. Duchamp's works are born of a rare mix of avant-garde transgressive fervor (which has its own erotic charges of desire and violence), patient, highly-skilled and painstaking craftsmanship, and careful, methodical, scientific, and philosophical enquiry into what by contrast appears the least erotic of all methodologies, that is, mathematical geometry. His pieces may, again at first glance, seem very distant from the precision and dry procedurality of the algebra associated with geometrical projections and transformations in calculus, but I would argue that his own unique approach to image and object-making has its foundations in the erotics that he found in mathematical conceptions, projections, and formulations of n-dimensional space, and the penetration of chance into ordered systems.

Furthermore, Duchamp was also interested in how systems, or machines, produce and reproduce forms and images, and also ideas, in nonstandard ways. The complex forms of projective geometry and algebra that he studied whilst a librarian at the Bibliothèque Sainte-Geneviève, Paris, in 1913, as well as the philosophical texts that he read on concepts of multi-dimensional space gave him key tools to be able to think of and produce artworks that we can now recognize or categorize as 'nonstandard series'[2]—a term today more typically associated with digital electronic fabrication technologies and parametrical scripting softwares. However, as a key example, it would be apparently absurd to conceive of *The Large Glass* (1915–1923) and *Étant donnés* (1946–66) as a series (as Duchamp does, in fact) without considering them a nonstandard series (as I do), because their forms are so very different, albeit that their component parts are given the same names by Duchamp. In the context of Duchamp's avowed interest in transformations (nonidentical reproductions) that take place through inter-dimensional 'travel,' it is clear to see how *Étant donnés* is *The Large Glass* reproduced inside-out and back-to-front, as he claims. To see this, however, it is necessary to consider that these works are strange diagrams in different dimensional registers that are linked by the shared coordinates along their literal and metaphorical 'seams.'

For Duchamp, the dialects of movement (how changes and stases are linked or interchangeable depending on perspective, like in mirroring)[3] delivers a cerebral erotics[4] that is the very basis of his entire oeuvre as well as his wider interests and activities, such as his lifelong dedication to chess. His works depict the erotics of sex and love, but, crucially, they also develop, produce, and perform less familiar erotics—diagrammatic erotics—that operate purely in thought experiments centered around theories of n-dimensional spatial movement. Such operations stay true to and highlight Duchamp's long-term fervent eschewal of experiential aesthetics in favor of cerebral erotics, also documented in many interviews and in his own writings, but most importantly performed by his works.

Duchamp, Marcel. *Chocolate Grinder #1*. 1913. Oil on canvas. 24 3/8 x 25 3/8 inches. Framed: 25 1/2 × 26 5/8 × 1 5/8 inches. Accession Number: 1950-134-69. The Louise and Walter Arensberg Collection, 1950. Philadelphia Museum of Art, Philadelphia, PA. Copyright: Artists Rights Society (ARS), New York / ADAGP, Paris / Succession Marcel Duchamp.

To begin with, in 1964, talking with Calvin Tomkins, Marcel Duchamp said:

> *All this talk about the fourth dimension was around 1900, and probably before that. But it came to the ears of artists around 1910. What I understood of it at that time was that the three dimensions can be only the beginning of a fourth, fifth, and sixth dimension, if you know how to get there. But when I thought about how the fourth dimension is supposed to be time, then I began to think that I'm not at all in accord with this. It's a very convenient way of saying that time is the fourth dimension, so we have the three dimensions of space and one of time. But in one dimension, a line, there is also time. I also don't think that Einstein in fact calls it a fourth dimension. He calls it a fourth coordinate. So my contention is that the fourth dimension is not the temporal one. Meaning that you can consider objects having four dimensions. But what sense have we got to feel it? Because with our eyes we only see two dimensions. We have three dimensions with the sense of touch. So, I thought that the only sense we have that could help us get a physical notion of a four-dimensional object would be touch again. Because to understand something in four dimensions, conceptually speaking, would amount to seeing around an object without having to move: to feel around it. For example, I noticed that when I hold a knife, a small knife, I get a feeling from all sides at once. And this is as close as it can be to a fourth-dimensional feeling. Of course from there I went on to the physical act of love, which is also a feeling all around, either as a woman or as a man. Both have fourth-dimensional feelings. This is why love has been so respected!*[5]

Here we see two of the most significant concerns in Duchamp's oeuvre: the adequate representation of love in aesthetic form, but without expressionist conceits; and the adequate representation of movement as a fundamental element of imagination, thinking, and erotics.

Both themes are consistent across, but not always explicit within, the huge corpus of writing on Duchamp's work, and indeed he himself often refers to these ideas. For example, when talking with Tomkins about one of the first 'readymades,' *Bicycle Wheel* (1913), Duchamp describes that it was important because of "the movement it gave, like a fire in the chimney, moving all the time."[6] Duchamp explains how movement incorporated into his work was more important than *expressing* or *depicting* movement as such. He makes an important distinction in this regard with respect to the painting *The Chocolate Grinder* (1913). It is far more sophisticated in its embodiment of movement than his 1911 painting *Coffee Mill*, which appears more in the tradition of dada diagrammatics, with its fragmented forms, repetition of the handle in different positions as it turns in time, the arrow depicting the turning of the handle, and the dotted lines tracing that movement. *The Chocolate Grinder,* however, appears to be a traditional single-point perspectival representation of a three-drum grinder depicted in stark chiaroscuro, but in

fact it is pregnant with the possibility of movement. The grinding drums seem ready to heave into rolling motion, as if they would fall towards the viewer on the inclined plane of the base, around the axle firmly spearing the center of the drums in place through their central point of horizontal rotation. Tomkins questions Duchamp on movement after a conversation about Georges Braque and Pablo Picasso's analytic Cubism, in which Duchamp is scathing about what he sees as the firmly traditional character of their paintings:

> *Imagine, in a world like the … world of the early Cubists like the landscapes of Picasso and Braque of 1909 and '10, nobody had an inkling of describing movement at all. … Completely static. They were proud to be static, too. They kept showing things from different facets, but that was not movement.*[7]

In reaction to the static quality of Cubism, which Duchamp had surpassed by 1912 with his Cubo-Futurist paintings, he says to Tomkins:

> *So I went on. The first thing I did in the direction of the Big Glass was The Chocolate Grinder … Well, yes, [there is movement] but not expressed. We know it should turn, but it was not trying to express the movement of that chocolate grinder at all.*[8]

What *Bicycle Wheel* and *The Chocolate Grinder* share is that they infer movement: the grinder should turn, and the bicycle wheel can rotate on its axle, creating a spinning vertical circle, and it can turn horizontally through 360 degrees, as it can be spun on its bearing embedded into the seat of the stool. This infers that it is a machine to produce a floating sphere (the spokes of the wheel should 'disappear' when spinning). It is a sculptural object that produces a to-be-imagined three-dimensional sphere from an ostensibly two-dimensional circle. But, because it is not motorized—like his *Roto Reliefs*, which when spinning create the illusion of 3D pulsating forms or voids from 2D circular spiral designs—nor is it spun by a gallery assistant at The Israel Museum, Jerusalem, where an exact 1964 replica of the 1913 version (with straight forks) resides, or at the galleries of MoMA, New York, where a 1951 replica of a later version (with more modern curved forks) resides, we can confidently say that this otherwise static object infers movement, and that this is its function. However, it not only infers movement in two-dimensions and three-dimensions, it also infers movement *from* one particular dimensional register *to another* without actually moving itself.

More important than what Duchamp said or wrote about his works, which is notoriously opaque and/or deliberately unreliable, is that we see this fascination with the inference of both love (sometimes the erotics of imagination, sometimes the literal phenomenon of

a subject loving something or someone, in either a sexual or Platonic manner) and movement (the mechanics of imagination) demonstrated in his works time and time again in the use of geometry; either literally in the use of explicit references to mathematical geometry, or in forms that function because of their actual or implied geometrical possibilities. Also, another key factor in considering Duchamp's works is the plotting of coordinates from one work to another, mapping a collinearity that may not be immediately apparent. Such rational operations are derived from his keen interest in non-Euclidean geometry (either elliptical or hyperbolic), projective geometry, and explorations of spatial multi-dimensionality.

The writings of art historian Craig Adcock show us that Duchamp had read the work of 19th-century mathematician Espirit Pascal Jouffret, and that many of his theorems are legible in Duchamp's pieces. Jouffret demonstrated in algebra how geometrical rotations in *n+1* dimensional space could allow for the superposition of symmetrical shapes or forms, which is otherwise forbidden in their shared n dimensional register. This is best described by the example of a pair of gloves: a right-hand glove cannot fit inside a left-hand glove, because the 'thumbs' are on opposite sides; however, if one glove is pulled inside-out (rotating it through a 4th dimension of space) they can be superposed in 3-dimensional space (one inside the other). Such an *n+1* dimensional rotation begins to explain Duchamp's claim that *The Large Glass* and *Étant donnés* are one and the same 'thing.' Also, Adcock makes the point that this is also how we begin to explain that Duchamp's alter ego Rrose Sélavy *is* Duchamp, but after a 'demi tour' through the 4th dimension—that is, Duchamp turned inside-out.

Similarly, it is known that Duchamp read the works of French mathematician Girard Desargues (1591–1661), whose work on the algebra of intersecting planes in conic sections is thought to be the foundation of projective geometry. Desargues is credited with the first documented theory that parallel lines meet at infinity (a key tenet in understanding the mappings between standard Euclidean geometry and non-Euclidean hyperbolic or elliptical geometries). Essentially, Desargues dedicated much of his work to analyzing the conic geometry of models of Renaissance perspective, exploring how the lines emanating from a center of perspective (either the human eye looking, or the vanishing point at the horizon) create cones through which planes can be intersected at various angles upon which 'images' are 'projected'—the most straightforward of which is the vertical 'picture plane' that is the foundation of the structure of most Humanist Renaissance art. However, the extrapolations of Desargues's work, where projection planes at different angles can be demonstrated to correspond in complex parametrical operations, led him

to his most well-known theorem: "Two triangles are in perspective *axially* if and only if they are in perspective *centrally*." This can be restated as: if the lines joining corresponding vertices of two triangles are concurrent, then the intersection of corresponding sides are collinear. This means that if the center of perspective shared by drawing straight lines through the corresponding indices of each triangle moves, or if the axis of perspective shared by all the points of intersection of all the extended vertices of each triangle moves, or both move, then the triangles are deformed proportionally according to the ratios of their axial and central collinearity. Such proportional deformations are what we see in Duchamp's *Small Glass* (1918) in *Tu m'* (1918), and in *The Large Glass*'s many different perspectival systems. This demonstrates that Duchamp was interested in the contingency of otherwise-made-constant elements of art-making, such as horizon lines, centers of perspective, plus other more complex axes of values and sign systems, which he would treat as malleable and 'serially variable' in a manner of complexity suggested by such theorems as Desargues's—unlike the work of even some of the most seemingly transgressive of his Dadaist and Surrealist friends and colleagues, such as Francis Picabia.[9] Also, the importance of triangles in the works of these mathematicians could also account for Duchamp's obsession with the number 3 and its multiples.

Such rational collinear malleability of constants, or invariants, may have also been inspired by Duchamp's knowledge of Henri Poincaré's *Science and Hypothesis* (1902–5), where Poincaré's investigations of non-Euclidian geometry and his theory of the fourth dimension refute the absolute invariant nature of geometrical theorems and postulates. In a long passage, Poincaré explains:

> *… [W]e do not experiment on ideal straights or circles; it can only be done on material objects. On what then could be based experiments which should serve as the foundation of geometry? … The axioms of geometry therefore are neither synthetic a priori judgements nor experimental facts. They are conventions …* disguised definitions.[10]

Such a verbose iconoclastic attitude may have inspired Duchamp to take the same view of all of the conventions of representation in art and aesthetics, as well as, of course, phenomenal reality and the nature of conscious access to it, and most importantly of all the many spurious rules of the art academy at the time regarding how 'the given' is to be represented/reproduced in and through art. What is sure, however, is that the combination of projective geometry, non-Euclidean geometry, and four-dimensional geometry that Duchamp was reading during the first and second decades of the 20th

century strongly impressed upon his thinking and working methods the notions of serial variance, malleability, and transformation, and the possibilities of rational mapping of such forms and processes of change no matter how removed from phenomenal experience, which all remain constant themes and operations in his works from 1913 onwards.

A crucial piece in this respect is *Unhappy Readymade* (1919) conceived of by Duchamp in Buenos Aires, Argentina (but produced by Suzanne Duchamp following instructions sent in a letter from her brother),[11] which is directly related to love, geometry, and movement. This piece was a geometry book tied at one corner and hung from a balcony at the apartment of Duchamp's sister, on Rue La Condamine in Paris, France, to be torn apart by the wind and rain (literal movement). It was also a wedding gift to Suzanne Duchamp and her husband Jean Crotti (celebrating, or perhaps berating, love).[12] Here Duchamp also deliberately introduces chance—as a form of encounter and as a driver of 'movement' and imagination (erotics)—as a medium to have this gift of filial love, which also celebrates matrimonial and sexual love, actually act in the way that love acts, that is, by chance.

Duchamp, Marcel. *Unhappy Readymade*. 1919. Original destroyed. Replica re-touched photography in *Le Boîte en valise de ou par Marcel Duchamp ou Rrose Sélavy | The Box in the Valise of or by Marcel Duchamp or Rrose Sélavy*. no. VII from the deluxe edition (Series A). Collotype With Pochoir. Accession Number: 1988.1.196.30. Gift of Paula Zurcher in honor of her mother Elizabeth H. Paepcke. Achenbach Foundation. Fine Arts Museums of San Francisco, San Francisco, CA. Copyright: Artists Rights Society (ARS), New York / ADAGP, Paris / Estate of Marcel Duchamp, 2019.

Unhappy Readymade, by contrast to many others of Duchamp's works, is not only not fabricated by [Marcel] Duchamp's hands, but is also a fragile object thrown into the wild elements to take its chances and be destroyed. The two-dimensional strata of the book (i.e., its 'flat' pages) are folded and crumpled by the wind as it spins on its wire axis, transforming the planar pages into three-dimensional forms. We can confidently assert that all of Duchamp's works from this period onwards necessitate the incorporation of chance, either as a medium directly, with its brutally raw operations, as in the case of *Unhappy Readymade*, or, as in the case of *3 Standard Stoppages* (1913–14), as a powerful inference that underpins the conceptual matrix that form all his works' functional efficacy as diagrammatic machines, which force into being abstractions as yet

un-experienced or un-thought. In other words, chance is used by Duchamp to provoke the inference of the 'not yet possible' to begin constructing the impossible—to infer the hidden within the given: the erotics of ontogenesis.

Further exploring the diagrammatic character and function of this and other works by Duchamp, David Joselit traces a path through mathematics and philosophy that leads him to Gilles Deleuze and Felix Guattari's writings, where he focuses on their notion of "abstract machines," to unpack *Unhappy Readymade*'s mechanics:

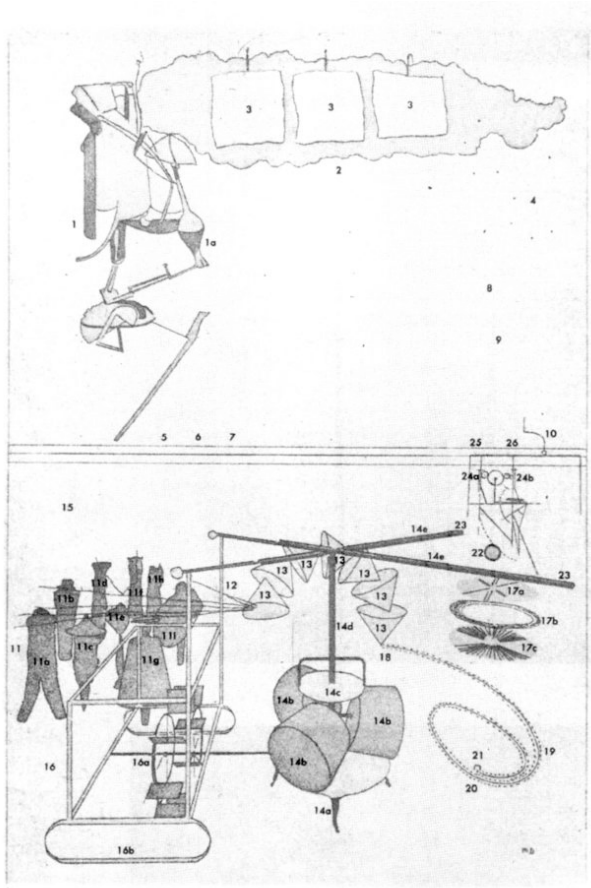
> *Defined diagrammatically … an abstract machine is neither an infrastructure that is determining in the last instance nor a transcendental Idea that is determining in the supreme instance. Rather, it plays a piloting role.… [It] does not function to represent, even something real, but rather constructs a real that is yet to come, a new type of reality.*[13]

If abstract machines, such as Duchamp's works, are neither infrastructural nor transcendental in these ways, then they can be said to also operate as love or erotics operate. Love and erotics take a subject by chance, unexpectedly. Love and erotics are not infrastructural to a given system's formation, but nonetheless exist as a symptom or side effect, perhaps even a short-circuiting or malfunctioning of a given complex system's operations, and can intervene at unexpected moments in its workings to disrupt the otherwise expected order or direction of its operations. Contrary to typical conceptions and characterizations of love and erotics, I argue that neither is structurally transcendental. In fact they can be described as the opposite, mundane, in useful ways. Not only have many psychologists (and poets and novelists) recorded over very long periods of time very similar typical descriptions of patients' (or characters') symptoms when 'in love,'[14] but we can argue from a rationalist perspective that rather than being beyond or above the range of normal or merely physical human experience, or existing apart from and not subject to the limitations of the material universe, love and erotics are a part of the normal range of physical human experience and do not exist apart from it, and are subject to the limitations of the material universe precisely because they are constructions of the human brain, which is an existent biomechanical material form, albeit a highly complex one. Love may simply be just one of many different intense concatenations of neuro-electrical storming with specific oxytocin hormonal flooding, caused by a combination of long-term mostly hermetic behavioral conditioning and the presence of certain patterns of sensorial stimuli. This triggers similar and often repetitive series of behavioral effects in the subject who has fallen in love. At base, love is merely a particular kind of 'focus,' albeit one that is experienced 'all around' and, we might say, in

the infinitive. Also, the 'piloting role' of the abstract machine, described above, has quite obvious (if not also quite crude) sexual connotations of penetration, as the abstract machine 'drills' into the existent reality to twist and reconfigure it to a new reality yet to come.[15]

In similar ways to the operations of love, Unhappy Readymade has no possibility of determining anything, as even its own fate as a physical entity relies entirely on contingency: Would Suzanne Duchamp and Jean Crotti make the piece? Would it be destroyed by the wind, rain, and sun? Would documentation of its performance remain? Also, its own conceptual matrix remains indeterminate, as its form, typically the carrier of conceptual coherence, is so indeterminate: Is it a physical object? Is it a performance? Is it simply an instruction? It is, of course, all of these contradictory elements; essentially, it is a concept that 'pilots' their possibility and simultaneously destroys their individual real actualities.

By contrast, Duchamp's most well-known masterwork, *The Large Glass* (1915–23), is far more obviously diagrammatic and machinic. It is also well known to be a machine of erotics, as Duchamp often stated. We know from interviews and from his writings that it is a diagram of sexual courtship, with bachelors masturbating in the bottom half, attempting to seduce the bride in the top half. But it is only when considering *The Large Glass* alongside its counterpart, *Étant donnés* (1946–66)—which Duchamp claimed both in writing and in interviews were one single work reproduced and made manifest in different dimensional registers, serially variable—that we see the full extent to which his works are abstract machines in the Deleuzo-Guattarian sense.



THE BRIDE'S DOMAIN (upper half of the glass):

1. The Bride (*Pendu femelle*, arbor-type)
   a. Wasp or Sex Cylinder
2. Top Inscription or Milky Way (the cinematic blossoming)
3. Draft Pistons or Nets
4. Nine Shots
5. Bride's garment
6. Region of the Gilled Cooler (isolating plates)
7. Horizon
8. Region of the picture of cast shadows
9. Region of the mirror image of the sculpture of drops
10. Juggler of Gravity (also called the Trainer, Handler, or Tender of Gravity)

THE BACHELOR APPARATUS (lower half of the glass):

11. Nine Malic Molds (or Eros's Matrix) forming the Cemetery of Uniforms and Liveries
    a. Priest
    b. Delivery Boy
    c. Gendarme
    d. Cuirassier (cavalryman)
    e. Policeman
    f. Undertaker
    g. Flunky (liveried servant)
    h. Busboy
    i. Stationmaster
12. Capillary Tubes
13. Sieves or Parasols (within are the Drainage Slopes)
14. Chocolate Grinder
    a. Louis XV chassis
    b. Rollers
    c. Necktie
    d. Bayonet
    e. Scissors
15. Region of the Waterfall
16. Glider (Chariot or Sleigh)
    a. Water Mill Wheel
    b. Runners sliding in a groove
17. Oculist Witnesses
    a. Oculist Charts
    b. Oculist Charts
    c. Oculist Charts
18. Region of the Butterfly Pump
19. Toboggan (or Corkscrew or Slopes of Flow)
20. Region of the Three Crashes (or Splashes)
21. Weight with nine holes
22. Mandala (a magnifying glass to focus the splashes)
23. Marbles
24. Boxing match
    a. First ram
    b. Second ram
25. Region of the sculpture of drops
26. Region of the "Wilson-Lincoln effect"

No. 10 and nos. 18–26 are elements that were not completed in the *Large Glass* (1915–23).

This diagram is based on Duchamp's etching *The Large Glass Completed*, 1965.

Diagrammatic interpretation of the *Large Glass* as completed (in Arturo Schwarz ed., *Marcel Duchamp: Notes and Projects for The Large Glass*, London: Thames and Hudson, 1969, pp.12–13).

To do this, however, we must first examine the ways in which this single two-part work is indeed diagrammatic, and a machine of abstraction. Deleuze-Guattari scholar and artist Simon O'Sullivan gives us a primer to structure our analysis of this work:

> *The intention … is to think specifically about the diagram … or, again, of diagrammatics as a form of expanded aesthetic practice—as well as, more generally (following Félix Guattari), about the role of diagrams in the more ethico-aesthetic practice of the production of subjectivity.… [Diagrammatics] forms a certain abstraction (from its various sources), suggests connections and compatibilities (across different terrains), and ultimately offers a certain kind of perspective (a meta-modelization) that might be considered a speculative fiction.*[16]

Given that it is well documented that Duchamp was interested in multi-dimensionality and projective geometry,[17] we can consider that in these terms *The Large Glass* and *Étant donnés* deploy an expansive and expanding framework of aesthetic praxis (the production

of art within a given art institutional complex, in the formal abstract sense) in the service of attempting to produce different forms of subjectivity—or, at least, they push so far beyond what the given collective subjectivity of the art institutional complex at the time of their making could recognize or accept as an art form that they create ruptures in the discourse of art that are still difficult to map. Clear evidence for this is that throughout his career, Duchamp's works could never be adequately categorized, whether by artists or art historians, for whom his works escape the logics of groupings and taxonomies because of their inherent strangeness and their in-built contradictions (or at least what seem to be contradictions from the vantage point of art historical methodologies of categorization). Similarly, these works "form certain abstractions from various sources" and suggest "connections and compatibilities across different terrains," such as the two forms of representational abstraction that make up the two halves of *The Large Glass*. There are also one-dimensional elements of *The Large Glass*: the lines where the glass is cracked, as well as the metal bands that traverse the join between top and bottom. And finally, there are zero-dimensional points in the upper half, which are holes drilled into the glass at the 'points' where Duchamp fired from a toy canon matchsticks dipped in paint, to represent the ejaculatory misfiring of *The Bachelors at The Bride*. These shots are three-dimensional actions represented in zero-dimensional form, as mere points. Equally, with *Étant donnés*, although when we look through the peephole of the barn door to view what is clearly a three-dimensional nude female figure in repose in a tableau vivant, with a two-dimensional woodland and waterfall scene behind, rendered by hand in paint from a photograph, our human binocular vision, which ordinarily gives us visual depth perception, is frustrated by only being able to use one eye and not being able to move, so there is no chance to verify three-dimensional depth by moving our visual sensory organ side-to-side or up-and-down. 3D is reduced to a frustrated 2D, making us 'peepers' the frustrated bachelors viewing the bride in a spatial realm our sense organ(s) cannot access, albeit except for the 'shadow' of this higher-order dimensional world that we can merely 'see.' Each of its manifestations—*The Large Glass* and *Étant donnés*—is a meta-model of each other, forming a reverberative set of asymptotic connections and compatibilities that can only be speculatively, or we might say metaphorically, rationalized. This is often referred to as the Surrealist poetics of Duchamp's work, which may be true, but such terminology has the unwarranted and negative connotation that the work is somehow ambiguous or ineffable. This further comment on diagrams by O'Sullivan helps us to understand that this typical reading of Duchamp's work as Surrealist is too limited, and instead we can propose that it is firmly realist—it is just that

the world(s) it creates, like the tenets of complex topology across dimensions upon which it is founded, is(are) not phenomenally accessible to us in our three-dimensional spatial register:

> *A crucial aspect of this formal understanding of the diagram—to return to Lacan—is its ability (or at least claim) to communicate without meaning. Indeed, this is very much the diagram's pragmatic character (it moves things on). In relation to this we might note that a text can operate diagrammatically, as in Lacan's suggestion that his Écrits was not written so that it might be understood (the writings, rather, "must be placed in water, like Japanese flowers, in order to unfold"). Jean-François Lyotard also suggests that the sign might operate as a tensor in this sense—demarcating a "region in flames"—not necessarily to be interpreted, but rather, again, to set things in motion.*[18]

Duchamp's works in general, and *The Large Glass* and *Étant donnés* in particular, certainly do not elicit 'meaning' as such because they communicate by existing and functioning within and between different dimensional registers, the movement of which is only ever partially accessible at best via other abstractions, such as language or other abstractions of thought and imagination that can only ever attain any traction on their reference to Duchamp's works as speculations.[19] As O'Sullivan also states, "Here diagrammatics announces a kind of nesting of fictions within fictions to produce a certain density, even an opacity."[20] We could say the same about love, in that it too does not communicate with meaning as such, but merely 'is' when it exists. The concatenation of intense feelings that love elicits in humans creates a feeling of increased density of the value of existence (feeling more alive) in the one in love in respect of their own life, and an increased density of value of the one loved (i.e., one values the subject of one's love more when in love than when not. This, of course, is inexplicable in some ways to the one in love, because the one loved has not really changed, but nonetheless is valued more densely by the one who loves them. Rather, the perceptual context has changed in the one doing the loving, in that they have fallen in love with them). The reasons for such increases in density are directly proportional to the level of difficulty in explaining these feelings (i.e., the opacity of such feelings), and so someone in love very often finds it difficult to explain because of what or why they are in love, other than that they are in love with the subject of their infatuation.

In such ways we can continue to explore how elements of this argument show that Duchamp's work is realist, but of course in an intra-telic manner equivalent to the operations of love as described above. Love produces this exaggerated value of the subject

that is loved in the perception of the one who loves, seeing something unseen from within the seen. Love creates new unexpected intentions in the one who loves towards the subject that is loved from within other already existent intentions that were different prior to the intervention of love. In all of this, love nests intentions and observations of different levels of intensity and density within and from each other, but it creates an experience of the destratification of these different levels of intensity and density as it erases any boundaries between them. Suddenly and unexpectedly, even otherwise previously inconsequential aspects of the one loved seem important when one is in love with a subject that one loves. For, example one might suddenly love the way the loved other eats, even though the one loving has seen the loved one eat before. Hence, the dizziness, elation, and confusion that many subjects who are in love describe of the feelings of being in love. It cannot be explained, apparently. This is a form of sidestepping; a transversal operation that love enacts and performs.

Duchamp, Marcel. *Étant donnés (Given: 1. The Waterfall, 2. The Illuminating Gas).* 1946-66. Mixed media assemblage: (exterior) wooden door, iron nails, bricks, and stucco; (interior) bricks, velvet, wood, parchment over an armature of lead, steel, brass, synthetic putties and adhesives, aluminum sheet, welded steel-wire screen, and wood; Peg-Board, hair, oil paint, plastic, steel binder clips, plastic clothespins, twigs, leaves, glass, plywood, brass piano hinge, nails, screws, cotton, collotype prints, acrylic varnish, chalk, graphite, paper, cardboard, tape, pen ink, electric light fixtures, gas lamp (Bec Auer type), foam rubber, cork, electric motor, cookie tin, and linoleum. 7 feet 11 1/2 inches × 70 inches × 49 inches (242.6 × 177.8 × 124.5 cm). Accession Number: 1969-41-1. Gift of the Cassandra Foundation, 1969. The Philadelphia Museum of Art, Philadelphia, PA. Copyright: Artists Rights Society (ARS), New York / ADAGP, Paris / Succession Marcel Duchamp, 2019.

This nesting and sidestepping is also a constant theme and operation in Duchamp's oeuvre, as parts and wholes interchange and boundaries between their discrete existence are erased or conjoined in folds. *The Bride, The Bachelors, The Waterfall, The Illuminating Gas, The Chocolate Grinder, The Glider, The Waterwheel, The Oculist Witnesses*, etc., all manifest differently in *The Large Glass* and *Étant donnés*, and these different manifestations of the same components existing in both parts of this single two-part, multi-dimensional work demonstrate the symbiotic meta-model status that each of the works has in respect of the other.[21] These components take different forms—two-dimensional, three-dimensional, one-dimensional, or zero-dimensional—sometimes the same sometimes different, depending on which is being viewed, *The Large Glass* or *Étant donnés*. Also, many of the components exist in other works made prior to or during the production of these.[22] In this way, Duchamp's works create this nested set of interchanging parts and wholes, one component never being precisely a part nor a whole at any given time; always contingent upon the others for framework and status, which shift in their formal coherence, but always along a plane of collinearity, where they can be transformed parametrically, albeit that this plane is sometimes abstractly metaphoric and at other times experientially literal, or both simultaneously. O'Sullivan notes another related attribute of diagrams, in that they "[bring] together different models, even placing one model 'inside' another … [T]he diagram is a way of re-positioning existing frameworks, and of working out possible relations as well as divergences."[23]

All of this is strongly reminiscent of what Deleuze develops in *The Fold* (1988), his famous exploration of Gottfried Leibniz's *Monadology* (1720) and calculus via the theme of the baroque. Certainly, all the works of Duchamp's oeuvre can be considered as points of inflection, or folds, in a plane of consistency where they are connected, manipulated, deformed, and transformed, but ultimately intimately integrated along various shared parameters or algorithms—sometimes literal, sometimes metaphorical, sometimes both.

And equally, the erotic thrill of the concept of infinity, central to Deleuze's reading of Leibniz, is key to Duchamp's works; literally referred to in the title of *The White Box, À l'infinitif* (1966), another compendium of notes about his works.

Where Deleuze explains the importance of infinity in the thinking of Leibniz, in respect of the operations of monads and their intra-telic inevitability, we see echoes of the intertwined complexity of all the elements of Duchamp's oeuvre:

> *A flexible or an elastic body still has cohering parts that form a fold, such that they are not separated into parts of parts but are rather divided to infinity in smaller and smaller folds that always retain a certain cohesion.*[24]

Echoing this, we can say that Duchamp replaces more typical conceptions of 'representation' or 'reproduction' (where one entity creates another discrete entity), in his work from 1912 onwards, with transformation, deformation, malleability, folding, enfolding, and unfolding—a revealing of hidden possibilities of the affordances or tolerances of the plane of consistency within which he is working. Reproduction in Duchamp's works is treated as a manipulation, deformation, or transformation through space and time, where what is reproduced is still intimately connected to its progenitor; a new point of inflection in a dynamic undulating, folding, and unfolding total system. It is a concatenation of simultaneities, an erotic experimentation that reveals itself 'all around'—like the multi-dimensional performativity of a basic verb form, 'the infinitive'; without a particular inflection binding it to a particular subject or tense, encompassing, enveloping, enfolding, and unfolding simultaneously, happening in the past, the present, and the future—like the feelings of being in love—but never severing it to become discrete and thus functionally idealist.

The contention here is that Duchamp's entire oeuvre is dedicated to a materialist exploration of dynamic contingent forces, and that it eschews more typical idealist preconceptions of abstractions (especially found in attitudes to art-making), such as is often found in the typical ways people conceive of the most abstract of phenomena, 'love.' There are striking similarities with the materialism of Deleuze and Guattari's *Mille Plateaux* (1980) that further help articulate some of the mechanics of Duchamp's project in this regard. For example, as philosopher and Deleuze scholar Ray Brassier explains:

> *The materialism laid claim to in A Thousand Plateaus is unlike any (other).... It does not pretend to accurately represent an objectively existing 'material reality' (whether natural or social), just as it does not propose practical imperatives derived from universal laws (whether natural or social). It seeks to conjugate an 'abstract matter,' conceived independently of representational form, with a concrete ethics, wherein action is selected independently of universal law.*[25]

Brassier goes on to say, "Here the abstract is no longer the province of the universal (invariance, form, unity) and the concrete is no longer the realm of the particular (the variable, the material, the many). The abstract is enveloped in the concrete such that practice is the condition of its development."[26] So, here, if Duchamp's primary subjects are love and movement—perhaps, as we have seen, synonyms in the world of Duchamp's oeuvre—we can assert that these are an abstract matter always independent of representational form as such. The introduction of an absolutely contingent ground that we find in Duchamp's claims to multi-dimensionality, always at play in his work, and the interchangeability of parts and wholes, prevents the possibility of any universal law governing action per se in a particular reality either represented or experienced (or indeed, in one only experienced in the imagination), as the always already possible (theoretically at least) piercing of any given order of reality (or dimensionality) by another order of reality (or dimensionality), and the concomitant transformations that such piercings produce, are ever-present, as demonstrated in the diagrammatics of his works. Thus, Duchamp's work does not propose any practical imperatives derived from universal laws. Instead, what nominal laws or rules may exist or be represented in Duchamp's works operate transversally, cutting across and through various other given rules, conventions, formats, forms, and systems (especially systems/regimes of representation) much in the manner that love rampages transversally through the given value-system(s) of a person struck by it, re-orientating, rotating, and generally disrupting and transforming their world, both literally and metaphorically.

The question of what kind of disruption of rules are created by such abstract machines as love or Duchamp's work can be well explained by the following passage from Brassier, where he describes the consequences of thinking through Deleuze and Guattari's re-conception of the relationship of the abstract and concrete:

> *Rules are no longer abstract invariants that need to be applied to concrete or variable circumstances. 'Abstract' now means unformed and ultimately, as we shall see, destratified … [A]bstract matter is described as constituting a 'plane of consistency' characterised by 'continuums of intensities', 'particles-signs' and 'deterritorialized flows'.... [They] insist that this plane of consistency (which they also call 'multiplicity') must be made, since it is not given: … made by mapping what is unrepresented in both thinking and doing.*[27]

This mapping of what is unrepresented in both thinking and doing is an excellent description of the intra-telic operations of Duchamp's works. The destratification of the presumed coherence required of a perspectival picture plane, for example, as disrupted in such works as *The Large Glass*, where 'flatness' and 'illusionistic depth' sit side-by-side in one work without hierarchy. We see this precisely in Duchamp's final painting *Tu m'* (1918), perhaps the first of his three great masterpieces, where we find a seemingly random array of pictorial conceits, apparently jumbled together in the long slender canvas. Incongruous and divergent perspectival systems reside on either side of the painting, elongated painted shadows of readymades hover in the middle distance, a perfectly flat sign-painted pointing hand guides us from left to right, the canvas is slashed and held together with safety pins in the center, and a bottle-brush sticks out at ninety degrees to the canvas surface. As confusing as it may seem, with all of these divergent picture-making methods clashed together, it is made coherent if we consider that this painting is a manifesto for giving up painting—for giving up a representational art based on abstract invariance that is typically applied to concrete or variable subject matter. The function of *Tu m'* could be said to de-stratify the entire tradition of Western art, and to institute an art that is a 'plane of consistency' that operates via 'continuums of intensities,' 'particles-signs,' and 'deterritorialized flows' that allow art forms to flow between different dimensional registers—between the realms of thought and matter as material abstractions in each realm, taking different forms depending on context, but preserving collinearity throughout.

Duchamp, Marcel. *Tu m'*. 1918. Oil on canvas, with bottlebrush, safety pins, and bolt. 27 1/2 x 119 5/16 inches. Accession Number: 1953.6.4. Gift of the Estate of Katherine S. Dreier. Yale university Art Gallery, New Haven, Connecticut. Copyright: Artists Rights Society (ARS), New York / ADAGP, Paris / Estate of Marcel Duchamp, 2019.

This materialist character of Duchamp's work is what lends it its pragmatic functionality also. The provisional, revisable quality of 'the diagrammatic,' of 'abstract machines,' and of 'the baroque'—this anti-idealist pragmatism—is observed also in the "definitively unfinished" status of *The Large Glass*. From the many preparatory drawings in *The Green Box* it is possible to show that several planned elements are left out, such as *The Boxing Match, The Butterfly Pump, The Toboggan,* and others.[28] Also, Duchamp referred to Étant donnés as an "approximation démontable"[29]—the phrase which greets the reader of his 1966 *Manual of Instructions for the assembly of Étant donnés.*[30] Throughout the instructions he gives much latitude for a would-be disassembler/assembler of the piece to make their own judgements about the precise placing of some of the elements (d'Harnoncourt, Introduction to the *Manual*). This confirms the pragmatic attitude that Duchamp had towards art in general, and that his works embody and perform specifically. It also attests to their strategic conceptual robustness, in that they do not even need to be made or reproduced absolutely perfectly or 'finished' to function perfectly. This is a far cry from what may seem like the petty/petit Humanism of Picasso and Braque's Cubism, where not only the hand of the artist is so necessary and important, but also the absolute finitude of any given painting itself. This gives us a clear understanding of the depth of the rift that Duchamp made between a constantly Humanism-dominated art world ethos that surrounded him and his work throughout his life, and from which he quietly but violently extracts himself and his work. Similarities here again can be seen with the perspectivist realist materialism of Deleuze & Guattari, as Brassier explains:

> *For 'machinic pragmatics', the efficacy of performance can no longer be subordinated to pre-established standards of competence. So long as practice is subordinated to representation, it can only more or less adequately trace a pre-existing reality, according to extant criteria of success or failure. But machinic pragmatics is not geared towards representation; it is an experimental practice oriented towards bringing something new into existence; something that does not pre-exist its process of production. It de-couples performance from competence. It does not engage in utilitarian tracing of the real; it generates a constructive mapping (and as we shall see, a diagramming) of the real…."*[31]

The manner in which Duchamp's entire oeuvre was constructed and developed operates in this mode of performative praxis, where abstractions are combined and re-combined in radically surprising, unfamiliar, and sometimes frustratingly opaque ways. This radical opacity of the works stems not, as is often claimed, from the shocked reactions to his work,[32] but rather it is Duchamp's constant tracing of what is not yet accessible to consciousness in relation to what cannot be 'felt' in the tactile three-dimensional world or 'seen' in either the spatial three-dimensional world or the planar two-dimensional world, which humans typically have phenomenal access to, that creates this density, opacity and dynamism.[33] His interest in the fourth-dimension of space, and other dimensional registers is fundamental to understanding this, and is what generates the radical machinic abstract quality of his work.

In conclusion then, I am arguing that Duchamp's entire oeuvre from 1912 onwards is both a diagrammatic form of love and life, not only because it putatively depicts love, love-making, and erotics, which are important here, but also and more importantly because as diagrammatic forms, as abstract machines, the way the elements depict what they depict actually operates in ways identical to the way that love and erotics operate. My argument here is that love is a feeling that is a diagrammatics of itself as life. As Duchamp's alter ego's name suggests, Rrose Sélavy (*"Eros, c'est la vie"* = "Love is life"), life and love are intra-telicly identical and without one the other does not exist: life without love is merely survival, and love cannot exist without living subjects that are truly living. Duchamp's diagrammatics brings into existence maps towards the possibility of forms of love that may not be accessible to us (yet), but which nonetheless have been mapped in forms that we can access, in anticipation of the future evolution of our capacity to think and feel in ways that will extend what it currently means to love.

Footnotes

1. The transliteration from French phonetics of *L.H.O.O.Q.* (el-ash-oh-oh-koo = "Elle a chaud au cul") translated into English reads "She has a hot ass!" Also, for example, the *Rotoreliefs* (1935–1952) when spinning give the illusion of pulsating organic protrusions or cavities, to be penetrated by or that penetrate the viewer's sight. Or, indeed, the painting *The Chocolate Grinder* (1913) whose title is a French euphemism for masturbation.

2. A 'nonstandard series' is characterized by serial variation; literally, a series of forms that share some core or superficial, or both, traits. As art historian Mario Carpo explains: "In technical terms, all objects in a nonstandard series share some algorithms.... In visual terms, a nonstandard series comprises a theoretically unlimited number of objects that can all be different but must also all be

similar, as the digital tools that were used to make them are a detectable trace in all end products." See Mario Carpo. *The Alphabet and the Algorithm.* MIT Press, 2011, p. 99.

3. It is worth noting here several photographic portraits of Duchamp that utilize multiple mirrors, and Duchamp's use of full or partial palindromes, such as "Anemic Cinema," and his love of and frequent use of puns, translations, and transliterations as forms of mirroring.

4. We might say an "erotics of imagination," if that is not already a tautology.

5. Calvin Tomkins. *Marcel Duchamp: The Afternoon Interviews.* Badlands, 2013, p. 93.

6. Tomkins, p. 53.

7. Tomkins, p. 72.

8. Tomkins, p. 72–73.

9. For a further exploration of this, see David Joselit. "Dada's Diagrams." *The Dada Seminars,* edited by Leah Dickerman and Matthew Witkovsky, Washington D.C., Center for Advanced Study in the Visual Arts, National Gallery of Art, in association with D.A.P./Distributed Art Publishers, 2005, pp. 221–239.

10. Hubert Molderings. *Duchamp and the Aesthetics of Chance: Art as Experiment.* Columbia University Press, 2010, p. 42.

11. For the letter writing of Duchamp, see Francis H. Naumann & Hector Obalk, editors. *Affectt Marcel: The Selected Correspondence of Marcel Duchamp.* Thames & Hudson, 2000.

12. Marcel Duchamp & Francis H. Naumann. "Affectueusement, Marcel: Ten Letters from Marcel Duchamp to Suzanne Duchamp and Jean Crotti." *Archives of American Art Journal,* vol. 22, no. 4, University of Chicago Press, 1982, p. 13.

13. Deleuze and Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia* (1980).Translated by Brian Masumi, University of Minnesota Press, 1987, p. 142.

14. It is almost banal to list these symptoms of love, as their regularity and familiarity and repetition in many contexts has perhaps become banal to observe, but perhaps no less typical because of this: feelings of elation, of intense focus on the subject of one's love, feeling distracted from and sometimes neglectful of other more typical routine but nonetheless important tasks, feelings of optimism, restlessness, feeling as though something powerful is emerging or unveiling constantly (i.e., one is never bored of even the most tedious of actions of the subject of one's love), feelings of intense energy and changes in behavior towards new possibilities, etc. The question of interest here is what combination of different intrinsic and extrinsic factors might elicit new and different manifestations of love, or something beyond it if one were to experiment with all the causal vectors of such intense feelings.

15. There is obviously a reasonably funny pun here, 'to come': the colloquial expression for reaching sexual climax or ejaculating. However, a serious point can be made about sexual climax and ejaculation, in that the abstract machine does drill, penetrate, pulsate, and spew out the conditions for the new reality yet to be made manifest. Also, the penetrative force of love to pierce the routine, typical behaviors of a given subject who is in love is worth noting as well.

16. Simon O'Sullivan. "On the Diagram (and a Practice of Diagrammatics)." *Situational Diagram,* edited by Karin Schneider & Begrum Yasar, Dominique Lévy Press, 2016, p. 13.

17. The writings of Linda Dalrymple Henderson are also important to this discussion, where she is able to map the influence of Renaissance geometers Jean François Niceron and Girard Desargues, as well as 19th-century mathematicians Henri Poincaré and Espirit Pascal Jouffret, upon Duchamp's thinking and approach, expanding work undertaken by Craig Adcock. See, in ante-chronological order: Craig Adcock. "Duchamp's Perspective: The Intersection of Art and Geometry." *Tout Fait Journal,* 2003, updated 2016. Available online here; Linda Dalrymple Henderson. Duchamp in Context: Science and Technology in the Large Glass and Related Works. Princeton University Press, 2005; Craig Adcock. "Duchamp's Eroticism: A Mathematical Analysis." *Marcel Duchamp Artist of the Century,* edited by Rudolf E. Kuenzli & Francis M. Naumann, MIT Press, 1991; and Linda Dalrymple Henderson. "The Fourth Dimension and Non-Euclidean Geometry in Modern Art." *Leonardo,* vol. 17, no. 3, MIT Press, 1984. See also: Henri Poincaré. "Chapter 6: Classical Mechanics." *Science and Hypothesis,* Walter Scott Publishing, 1905, pp. 89–110.

18. O'Sullivan, p. 14.

19. But Duchamp's works certainly 'set things in motion,' in just the same way that love 'sets in motion' certain behaviors.

20. O'Sullivan, p. 23.

21. For a full description of the symbiotic meta-model status that The Large Glass and Étant donnés are to each other, see notably the writings of Duchamp himself: Marcel Duchamp. *The Bride Stripped Bare by Her Bachelors, Even* (*The Green Box*). 1934. Box containing collotype reproductions on various papers; Marcel Duchamp. In the *Infinitive* (À l'infinitif) (*The White Box*). Cordier & Eckstrom Gallery, New York, 1966. Box of 79 facsimile notes (dating from 1914 to 1923) contained in a Plexiglas case with a screenprint reproduction of the Glider Containing a Water Mill on the cover. See also: Anne d'Harnoncourt & Walter Hopps. "Etant Donnés: 1° la chute d'eau, 2° le gaz d'éclairage. Reflections on a New Work by Marcel Duchamp." *Philadelphia Museum of Art Bulletin,* vol. 64, no. 299/300, 1969, pp. 5–58; Richard Hamilton. *The Bride Stripped Bare by her Bachelors, Even: A Typographic Version by Richard Hamilton of Marcel Duchamp's Green Box.* Translated by George Heard Hamilton, J. Rietman Publishing, 1976; and Elmer Peterson & Michel Sanouillet, Editors, *The Writings Of Marcel Duchamp.* Da Capo Press, 1989.

22. For example, the *Bride painting* (1912), the *Chocolate Grinder painting* (1914), *Glider Containing a Waterwheel in Neighboring Metals* (1913–15), Nine Malic Moulds (1914–15), the *Network of Stoppages painting* (1914) that is transposed as the capillary tubes from the *Malic Moulds* to the *Chocolate Grinder* in *The Large Glass*, and several others.

23. O'Sullivan, p. 20.

24. Gilles Deleuze. *The Fold: Leibniz and the Baroque.* Translated by Tom Conley, The Althone Press, 1993, p. 6.

25. Ray Brassier. "Concrete Rules and Abstract Machines: Form and Function in A Thousand Plateaus." *A Thousand Plateaus and Philosophy,* edited by Henry Somers-Hall, Jeffrey A. Bell, & James Williams, Edinburgh University Press, 2018, p. 260.

26. Brassier.

27. Brassier.

28. I am notably thinking about Jennifer Mundy. "An Unpublished Drawing by Duchamp: Hell in Philadelphia." *Tate Papers* #10, Tate Publishing, 2008, Fig. 5.

29. "De-mountable approximation" or "dis-assemble-able approximation."

30. Marcel Duchamp & Anne d'Harnoncourt. *Manual of Instructions for the assembly of Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage.* Yale University Press, 2009. Details can be found online here.

31. See Brassier, pp. 261–2. He notably refers here to Deleuze & Guattari, p. 13.

32. For example, the shock caused by *Nude Descending a Staircase #2* (1912) at the Armory Show in New York City in 1913, or the shock of *Fountain* (1917) when it was rejected from The Society of Independent Artists un-juried inaugural exhibition at the Grand Central Palace, New York, April 10–May 6, 1917, or the shock of him 'giving up' art to play chess in 1923 when he returned to live in Paris.

33. Hence, Duchamp's antipathy towards what he witheringly called "retinal art."

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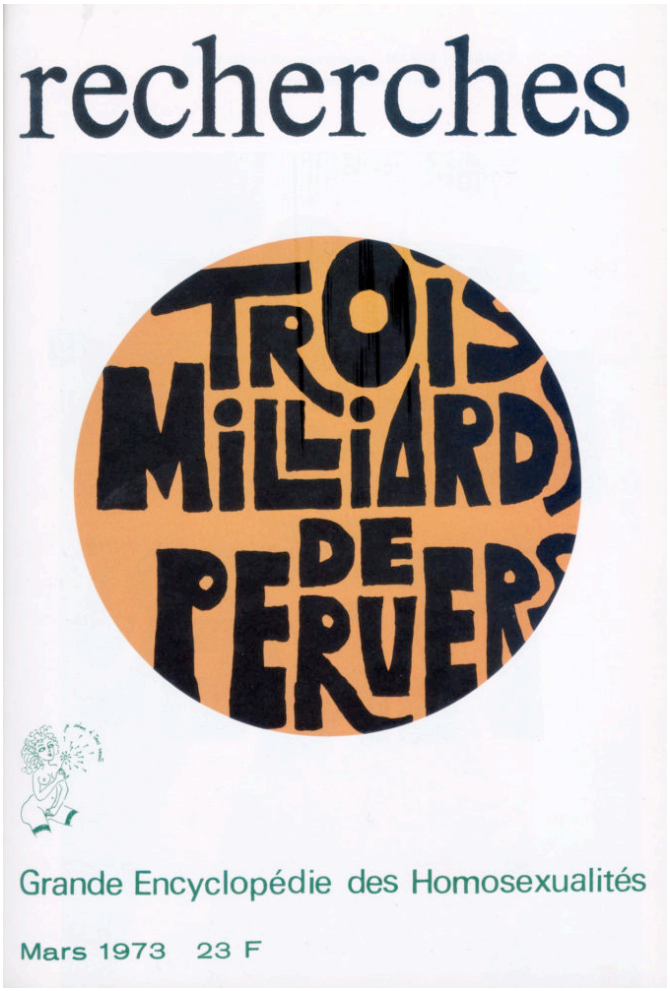
Three Billion Perverts (1973)

Anonymous

“Trois milliards de pervers: Grande encyclopédie des homosexualités” (“Three Billion Perverts: The Big Encyclopedia of Homosexualities”) is the title of the twelfth issue of the journal *Recherches*, founded in 1965 by Félix Guattari. Published in March 1973, this issue caused a scandal, proclaiming the irruption of homosexuality in French society. Very quickly banned, seized, and destroyed for breach of moral standards, it became a milestone in the history of homosexual struggles. Recently reprinted, this publication is at once an historical document and an element of reflection for contemporary struggles for emancipation, shedding light on what could be a homosexual affirmation conceived as a radical break with the normative structures running through the social space. Combining testimonies, original texts, and interviews; articulating social criticism, literature, philosophy, and psychoanalysis; across spaces as diverse as cafés, political meetings, prisons, asylums, parks, and urinals; and bringing together contributions from such figures as Gilles Deleuze, Fanny Deleuze, Michel Foucault, Jean Genet, Felix Guattari, Daniel Guérin, Guy Hocquenghem, Jean-Jacques Lebel, the actor Marie-France, Vera Memmi, Jean-Paul Sartre, and Jozy Thibaut, “Trois milliards de pervers” takes the form of a collective of homosexuals reflecting on the come-on, masturbation, transvestites, scouting, and militant movements, in order to call into question all forms of desiring-production. As such, this publication set out to establish an entirely “new scientific spirit.”

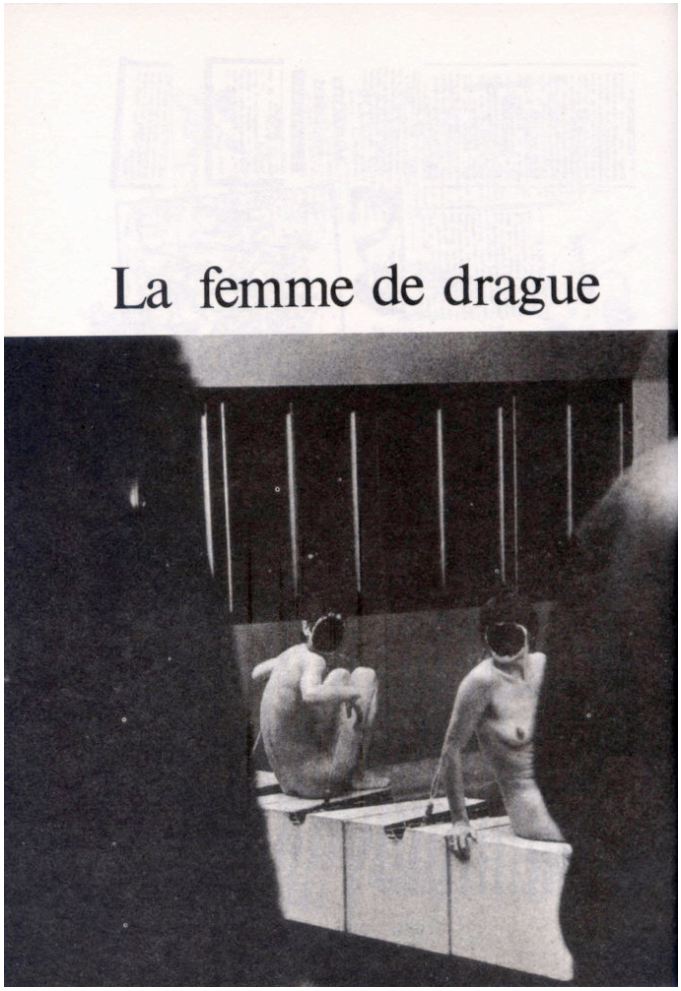
We are reprinting here a fragment of this historical archive entitled “La Femme de drague,”[1] a conversation between seven woman addressing the social and affective economy of seduction. This is preceded by Michel Foucault’s testimony at the trial of Félix Guattari, in 1974, after the publication was seized.



Michel Foucault’s Testimony at the Trial of Félix Guattari

“There are three problems with this trial.
The first, which is apparent, is not, I believe, the most important one. It’s freedom of expression that is the issue: Is it pornography or not? The court would like to confine the trial to this aspect.
In fact, behind this first question is another that is much more serious: Will homosexuality, as a sexual practice, be granted the same rights of expression and practice as so-called normal sexuality? But it isn’t in these terms that the magistrates intend to conduct the arguments.

In third place arises the fundamental problem: the relationship between politics and sexuality.
Does sexuality, the demand for sexual rights, the possibility of practicing the sexuality that one wants, constitute a political right? Can we, now, around those terms, constitute a movement whose objectives are ultimately political? This is the whole problem of integrating sexuality into the political battle.
And therein lies the fundamental issue raised by this trial. The problem is that neither the government nor the magistrates representing it want the question raised in these terms. So they have limited the trial to a much easier question to ask: Is it pornography or not?
Is the incriminated publication an issue of truly serious, academic research and investigation or, on the contrary, a compilation of smut? I don't think we should let ourselves be entrapped in this way. The content of the journal, the nature of the illustrations, the value, the boundary of pornography that they cross or that they don't cross, all this is, I believe, of no importance. The serious issue, once again, is that of sexuality in politics. When we see today the importance that the MLF[2] has assumed, the issue of abortion, when we witness the candidacy of the clown Monsieur Royer,[3] we can be sure that this is a key area of contemporary society. And not only of society but also of politics.
For a whole politics of the body has been enforced. In effect, since the 17th and 18th centuries, the human body has been used, locked down, held in check, constricted as work force. This policy consisted in extracting the maximum useable forces for work and the maximum useable time for production. Currently, what is being put to question is this: Are we going to be able to regain possession of our own bodies, and of the bodies of others too—with all the relations this implies—for purposes other than this use as a workforce?
It is this fight for our bodies that makes sexuality a political issue. It is understandable, in these conditions, that so-called normal sexuality, that is, reproductive of the workforce—with what this presupposes in terms of a rejection of other forms of sexuality and the subjugation of women—wants to be considered normative. And it is equally normal that, in the political movement aimed at regaining possession of the body, we find movements for the liberation of women as well as for male and female homosexuality."



La Femme de Drague

Christiane: There are lots of ways to come on to someone. No one has ever seen me doing so cause I manage to do it without being noticed. I can tell you what I do: One method is to throw yourself on a piece of ass, just like that, saying come with me, etc., or you can simply make yourself receptive. It's very common with women. That's what they do. They don't usually lunge at a man's fly … or a woman's pussy. They usually show that they're ready and willing so that the other person notices and does the rest. And there is no mistaking it. It's a code. All you have to do is be in the right place at the right time, in the right conditions, and act the right way.
Annie: Conforming to what the guy expects of you…
Cathy: Depends on the relationship I'd say: In relationships one person acts and the other is acted on, and it isn't necessarily the guy, it could be the girl. As a girl, I've seen women act like that towards me, so it's not a question of gender in these cases, it's a question of a relationship, where one person acts and the other is acted on.

Christiane: Gotta say, it's not like that anymore. How was it we didn't dare before?
Ozane: I would've liked to but didn't know how … There were times I wanted to connect with someone and I didn't know how to go about it because it felt like doing something aggressive… Having something to gain is dreadful, it's paralyzing and in the end I couldn't do a thing. I wasn't going to put myself in the position of trying to win someone over when I'd have been happy to just make a connection, I didn't know how to go about it. Seems like there are other ways of connecting with people.
Christiane: Connecting with someone is one thing, coming on to someone is another. When I'd come on to someone, I felt like I was doing something shameful. If you're there without a whole lot of people around you whose only desire is to throw themselves on top of you or fall to their knees in front of you, without this crowd paying tribute to you and you there like their queen, you feel isolated, neglected, shameful, lonely, and alone. It's not a good feeling. If at a time like that you happen to go out to a café, and you look around you instead of looking down, that's seen as a come-on, if you go dancing in places where there are people, you don't feel good, you feel kinda shameful and gross. But then coming on to people is simply a matter of being there, looking at what's going on and being ready for whatever happens.

Receptiveness

Ozane: I don't call that coming on to someone, I call it receptiveness.
Anne: I find I can't follow through when it happens. I remember, for example, days when I was feeling really lonely and I went for a drink, just like that, at La Coupole, a typical place, and if someone happened to talk to me, I'd stick my nose in my book. Because there's something in the come-on that just doesn't sit well, cause it can't be on the basis of my face alone that someone would want to start a relationship with me. If it's from my face alone, it must be my ass not my face, or the fact that I'm a woman, so it can't be a meaningful relationship. I feel like any relationship you start has to be lasting, otherwise you're a whore. Two or three times I did things like, a guy'd come up to me in the street, he'd have a relatively nice face, we'd talk, for example, there was this black guy who I walked through Luxembourg with one day, another time there was this painter… We talked and then I make a date to meet up with him two or three days later and the guy doesn't show up of course. And if someone approaches me in the métro, it happens a lot with foreigners, and I respond without thinking anything of it, just like that, to talk… Once the guy chased me afterwards, haranguing me with insults; I'd simply talked to him politely in the métro with no hidden agenda. I had no desire for it to go on any longer than that. Once at a meeting of Cahiers de Mai on Usinor-Dunkerque,[4] they'd brought

workers to the meeting, the questions asked by the leftists were completely idiotic and I let them know I thought their questions were stupid. Later, we went out for a drink with the workers, and the militants had everything planned, the place where they'd sleep, wake-up at 6 in the morning to catch a plane to go to another meeting in Lyon. The nicest guy, who'd noticed me during the discussion, said to me, "There's room at your place?" And then we spent a very enjoyable night together and we exchanged telephone numbers and addresses, but nothing came of it. I had two or three relationships like that, cool but short-lived. Don't know if that's a pick-up, but they were in complete contradiction with the idea I had of casual relationships as sleazy.

Ozane: And the upshot? Nothing? You never got together with these people again?

Anne: Bottom line, I couldn't give a fuck. For example, one day I was on my way home, carrying a bunch of books. A guy with a relatively nice-looking face comes up to me and says: "What are you doing with those? It's incredible to see a girl on a Sunday afternoon in the middle of the summer with three books. Show me what you're reading… Philosophy, that's so unusual. What are you reading this for? I'd really like to talk with you." He took me to a café. He was a painter. I wanted to see his paintings. He had to add a coat of varnish. He takes me to see them. He explains why his paintings weren't remarkable, how the money system worked, the contracts that forced painters to make a painting of a certain size every month. We spend the afternoon talking. Then he takes me to my place. When I was about to leave him he started fondling me, saying he'd really like to get together with me again, and at the same time he tells me about his wife, who he'd left because she pissed him off, right off the bat going into bullshit that pissed me off. I give him my number anyway, just to get rid of him. I give my number to people to get rid of them because I'm never home.

Cathy: What you're saying right now is that the come-on is something that happens to you from the outside, it's not you. There are people who… so you hook up with them or you don't. My experience is not that at all. It's not a matter of being heterosexual or homosexual, that's for sure, just look how it is between us.

Christiane: There's still something I'd like to point out, it's that I've never come on to a woman. There are times when a woman comes along and a relationship develops, an attraction on my part, a mutual relationship that develops, meaning with a complete person. Don't know what I like about her, it's not necessarily her figure, it's what she says, who she is, don't know exactly what. At a time like that, there's an affinity, it's

situated in the realm of relationships. I've never come on to a girl. The come-on for me is situated in the institution and the institution is heterosexuality, men coming on to women. Women are not situated in the institution; with women there are relationships.
Ozane: But a woman can come on to you.

The come-on as institution

Christiane: I guess that must happen. I guess I must have felt too uptight, or I just didn't notice it when I had the feeling I was simply developing a relationship. I have this way of acting toward a come-on that is visible on me, cynical and precise: Yes, if I'm the one coming on to someone, otherwise it makes me really uptight, coming from women, since for me it's not in the institution, it's in nature. The come-on is connected to the institution of fucking. The institution is fucking.
Ozane: When coming on to others, you don't think you've ever made them uptight?

Christiane: I'm extremely guarded about it, they can see it or not. In any case, it doesn't get them as uptight as I get when a guy throws himself on me saying, "So here we are, all alone, my pretty," even if there are six of us there, it's all the same.
Cathy: In the institution, it's hetero come-on or active-passive come-on, with precise roles. In the small portion of my life when I was heterosexual, I was the one who'd do the coming on. I didn't have that attitude of… oh, I see, he's coming on to me, well I'm okay with this one, that Ann was describing. I was the one who'd say to myself, that one, he suits me, let's go for it. Not at all an attitude of receptivity. I've used the same type of come-ons with men and with women.
Christiane: The way I'd come on to men is similar to you, except that with me, it was underhanded, I got the message across by a general way of behaving, I didn't pounce on their fly.
Cathy: When you talk of pouncing on a guy's fly, except when people are completely uptight, it really doesn't seem to me to be the issue. When I'd hear my gay friends talking, they don't pounce on each other's fly, there's a relationship that develops in words, and it's not "zip." I don't see where the come-on begins and seduction ends.
Annie: Even in the MLF,[5] there are specialized establishments: Some girls will go dancing at the Katmandou.[6] I've always felt deeply outraged by this. They go dancing, looking for girls.
Cathy: When I go dancing at the Katmandou with someone, it's that there's no physical relationship yet, but it can develop and this can be by going to the Katmandou, or going out to eat together.
Ozane: There are not that many places where you can hold a girl close. You feel at home, happy in the Katmandou.

"An immediate mutual code is only found in come-on situations"

Cathy: There's a side to the come-on that I like quite a bit, that's social and about representation, which is that, as long as the code's mutual, which is what I'd like, a real relationship can grow out of this mutual code. An immediate mutual code is only found in come-on situations: You come into a place and there's someone's there facing you and there's a potential that things could happen right away with that person. This state, the potential that things could happen right away, is a cool place to be, in my opinion, and what's totally far-out in this regard is what you can propose at a time like that to make things happen.
Christiane: Cathy's moving here to the final picture when I'm simply sketching a crude picture!

Cathy: The crude picture of a come-on is when you pounce on someone to have sex, when you get right to the point. This picture can be transformed to the point that the come-on becomes a game two people play, when the people there are the same, meaning two individuals who don't know each other, but the discourse is nevertheless somewhere else, not only about fucking.

What do you come on to?

Annie: I've never come on to people; others may have come on to me, but I was so uptight, I didn't notice it. It's what you were saying before, when someone accosts you and he addresses your face, your ass, not you as a person.

Cathy: I could raise an objection to that. You can see someone's personality on their face, their body, the way they hold themselves, if you have a certain amount of sensitivity to people.

Annie: A person's way of holding themselves is their way of giving a certain image of themselves. My sense is that it's a false image.

Cathy: Even with a minimal degree of connection with people, you can get a pretty good handle on them, so that when you're addressing them, you're not only addressing blue eyes, etc.

Anne: If you're addressing a body, which really turns me off, that's why you'll come on to this one rather than that one. In relationships that involve having been together in meetings, having heard the person speak, knowing what's on their mind, how they talk, then I can choose, because for me that's the decisive criterion, while based on physical aspects, on the street level, apart from people who with a fascist face, everyone else attracts me equally, and there are plenty of people who don't have fascist faces.

Cathy: Maybe it's a matter of developing all possibilities. For me, it's specific, that's for sure. There's a certain number… but if I start defining this number, it's definitely not in relation to the experiences I've had. It's a wide range of people. But no one's asking me to choose from that. That's when the other more or less steps in.

Annie: But if you start judging by appearances, why is it always the same people who get hit on, and the same people who stay in the shadows, who are unremarkable. When you come on to someone in the street, you're judging them on appearances.

Cathy: I'm not so sure. It's also in your head. When I was in boarding school, there were two or three girls who everyone looked at. And those girls were lonely and unhappy, they didn't feel good about themselves, they felt ugly, etc. For me, I really can't say if the people I look at are people who others don't look at.

Clubs

Catherine: I have very little desire and for very few people. To me, coming on to someone involves a whole code that I'm incapable of applying. When I'd go to clubs, for example, I'd notice that girls were making eyes at each other, and I couldn't put on that kind of an act, I'm just not capable of it. When I go to a club thinking I'm going to pick someone up, I find I don't actually have any real impulse to do so. I look at the girls in the club and there isn't a single one I fancy. So I take a coin, saying to myself, okay, this girl heads or tails, I have to make a choice. The first time I decided to come on to someone, it was because I'd been in love with a girl for six years and I'd been completely alone for four years. So I said to myself, this can't go on. I went out and it felt like I was jumping from the third floor when I said "hello, what's your name?"

Cathy: Very soon you end up coming on to people outside clubs because in clubs, it's worse than the code. It's always the same small closed world, and very very soon it becomes exasperating. Coming on to people, just like that, in life everywhere, is a blast.

Annie: But before the movement to meet other homosexuals, your only choice was to go to a club.

Can a woman be homosexual inasmuch as she has desires for you?

Annie: Before the movement, the women I'd meet, well there'd be a percentage that were homosexual and a percentage that were heterosexual, and I'd fall in love indiscriminately, and each time I'd fall for heterosexuals who were completely uptight.

Cathy: You can also meet heteros who are not uptight; and the others, you can also make them uptight at first. What interests me in the life of a woman is who she is with me right there and then when she's facing me. Her past, her future, at the outset, I don't really give a shit. At the outset, I don't give a flying fuck about knowing who she is.

Christiane: I had lots of stuff that didn't lead anywhere because the response wasn't there. I'd send a message, no response, another one, no response, then she takes off in a plane. It's true that it happens all the time. The problem is not about asking someone, are you homosexual, you are, then let's go to bed. It's a matter of starting a relationship in general and when the person was heterosexual, and not interested in anything, it'd become a relationship of friendship.

Annie: You've got to know how to create a relationship of friendship and a relationship of friendship is created through language. You have to know how to talk. I clammed up hundreds of times because I didn't know how to interest someone through my language and my culture.

Catherine: Most of the girls around me were good talkers and would seduce by being smart-asses. So I figured it wasn't worth even trying, it would never work.

Pleasure, anticipated and shared

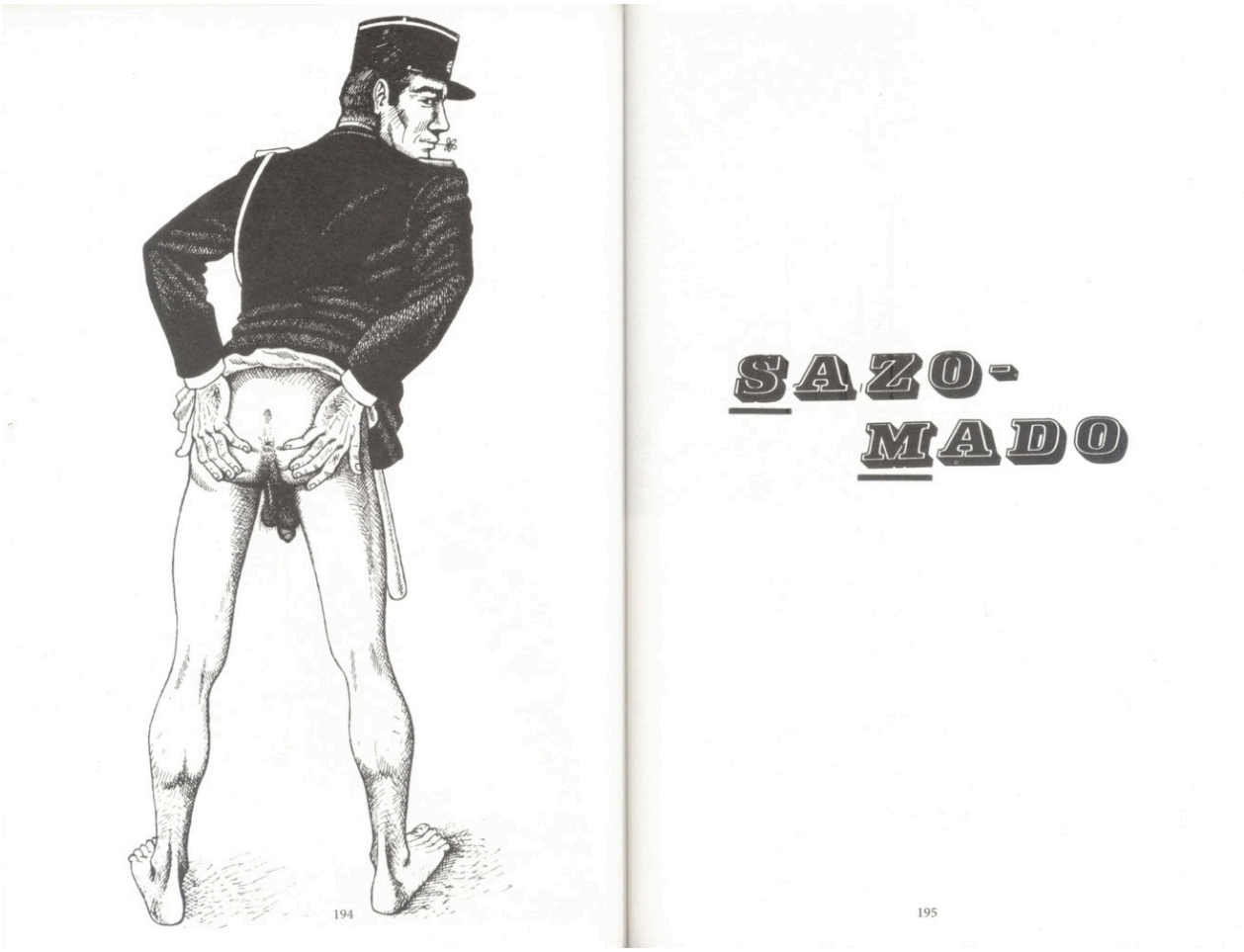
Cathy: That's what I thought at first; I thought, they're expecting something from me. What is it? Will I manage to fulfil my mission? If you have someone facing you and you're feeling like that, things usually go pretty badly. At some point, about the time that I started becoming much less interested in clubs and I started to go fishing in life, the problem was no longer whether I'd be up to fulfilling who knows what role, but whether the anticipated pleasure was shared. Seeing someone for ten minutes in six months makes you anticipate the pleasure of a relationship. Once you have this sense of anticipated pleasure, you figure you'll find out whether it'll be shared. And this no longer concerns you as an individual, in terms of your essential values that are so precious to you.

Anne: Anticipated pleasure is something I'm much more familiar with in the repetition, in the fact of seeing someone again, but the first time I'm scared out of my mind and at the same time I have the impression that things will go very badly..
Cathy: But what does very badly mean at a time like that?
Anne: Very badly, well, for example, that we'd talk and bore each other to tears, then, if it's with a guy, that he doesn't get a hard on or that I clam up completely, or, for example, when I made love to another girl besides you, it was very unpleasant, it was a bummer. Experiences like that are a real bummer, it doesn't give me any desire, it inhibits me for sure when it comes to starting a new relationship. It's absurd because if we really love each other, or something of the sort, we keep at it even if it doesn't work so well the first time.
Christiane: In a conventional pick-up, there's a total lack of consideration for the other person, the other is treated as an object. Do we ever have this type of relationship?
Anne: My impression is that there are guys who when they come on to you treat you like an object, and if you happen to react as a person, not passively and defensively, they go away with their tail between their legs.
Catherine: There have been times when someone came on to me in a way that I found very seductive and that sparked a desire in me to get to know the person.

Testing your power of seduction

Cathy: And what's wrong with testing your power of seduction. I don't see such a big difference between when someone you've loved for six months tells you you're beautiful and when it's someone you've never seen before. It's reassuring in either case.
Anne: But being reassured about your beauty in a pick-up situation is being reassured in relation to a model.
Cathy: It's not about beauty, it's about your power of seduction. By power I mean potential, possibility, having the sense that you're pretty and attractive, like having the sense that you have the potential to write a beautiful text.
Rachel: It's not the same thing when it's people or when it's paper and ideas in your head.
Cathy: Why shouldn't a sense of one's power of seduction be a factor among others. There are times you want to prove things to yourself.
Anne: If we define the come-on as a way of entering into a relationship with people who you make love to, there's no reason for it to end. There are different ways of starting a relationship.

Christiane: To me, when what you're doing is coming on to people, you're presenting yourself like someone out on a hunt and looking for game. Entering into a relationship is very different. I know very well there are overlaps, but it still seems to me that they are two separate realms. The starting point here is going hunting and seeing others as game.
Cathy: What you're saying is so Manichean. It isn't true that in a deep, ongoing relationship, an intelligent relationship, there's nothing, at the beginning at least, that fits your hunt-game category, that makes me say about a girl I've seen only two times in my life, hey, I'd like to sleep with that one. There's this prior desire to reach a goal that the other person is not necessarily aware of, which puts her in the position of game, but this doesn't stand in the way of developing a beautiful, satisfying relationship in the end.
Rachel: To me, the come-on is something very simple: It's the guy who goes out at night to find a girl, he doesn't even choose. It's something institutionalized, the pick-up on the Champs Elysées at night, the cars stopping, etc. When it's more subtle, it can sometimes be appealing.
Anne: But that's the kind of thing we know inside out; might as well go hand out fliers about it on the Champs Elysées. What are we doing here? Are we talking about the subject to get rid of a number of inhibitions or to prepare a tract for the Champs Elysées. None of us are concerned by come-ons on the Champs Elysées.
Rachel: But homosexual come-ons between women are exactly the same, they even seem worse to me cause I was expecting something different from women. We go clubbing by category: It's a leather jacket club here, a jean club here, an Arab club there. It's disconnected from human relationships, from life, and it's not even sexual, it's gymnastics, it's flat out about a piece of ass, when you're in the dark you don't even see who it is, for balling. I asked someone why do you do that when you have a girlfriend at home and you could be doing other stuff. It's satisfying a relationship to a piece of ass, abstractly. From women, I was expecting something else. I've been to lots of women's clubs and it struck me. Have to say a lot of the women there didn't like it either. In these clubs, I didn't even have the guts to dance when I like dancing a lot, because when a girl invites you it's not to dance it's to come on to you. Once, we started dancing as a group, everyone felt better, it was not that closed thing with everyone looking to get something from someone else and everyone feeling uncomfortable. Treating others like an object is not worthy of us as feminists. And, when we talk about the come-on, I think of these types of relationships.



Evelyne: People have come on to me, but when it comes to coming on to them, I don't really know how to go about it. When someone comes on to me, I don't even realize it. And when I realize all the conning that went into it, I get really paranoid. It stops me dead in my tracks. I simply can't go on. It paralyzes me totally, I don't know why I'm doing this. The only time I tried, I took one step forward and four steps back, and as a result nothing ever happened with that girl.

Catherine: To get people to come on to you, you have to do a number of things. I've had people come on to me, but I behave in a way that blocks them, even girls who appeal to me.

Evelyne: I always thought this was something only guys did. Then I discovered in the movement that girls were coming on to me. I'll usually throw a bucket of cold water on the girl, saying "so you want to sleep with me?" Of course, she's not expecting that at all.

Anne: What is it about our little bodies that's so precious that we need to protect it and reject the other person's desire to sleep with us?

Annie: When a girl you don't know comes on to you, well you tell yourself you're just an object to her, that's all.

Anne: What I found physically trying in relationships with guys, when they treat you like an object, is how physically unpleasant it is, they jackhammer you, you don't feel a thing—when you don't actually feel pain—and then when they're done… It sucks big time. That's what I call treating you as an object, the guy who comes up to you from behind. Mademoiselle, do you have far to walk? You're a student? Can I keep you company? And, if you laugh in response, he splits. You can see very well that if you and he had screwed, it would've gone very badly, he wouldn't have been able to get it up or, if he did, he'd have shot his wad in no time. There's that whole side of it that's dreadful. But there are also relationships that are direct and cool. Like, after one of our meetings, a guy said, "Can I come over and sleep at your place tonight?" I said yes right away because it was frank, direct, clear, and it went really well, it was really cool. We'd noticed each other in political discussions, that's what started the relationship, of course it's not a guy accosting me in the street. If a guy comes up to me in the street in a really nice way, why couldn't that happen, there's no reason to give priority to an approach on a political plane over an approach through a commonplace, everyday phrase.

Desiring someone is fucking scary

Catherine: I get the feeling that we don't want to admit that desiring someone can be fucking scary. It gives you the impression that you're going to be dragged into something that you won't know how to respond to. In my case, for example, I was once raped by a heterosexual because I didn't have the guts to say no. That's why I'm often afraid of desire, I don't want it cause I tell myself I won't know how to refuse.

Evelyne: The thing is, it should be possible for a girl to come tell you she wants to sleep with you, knowing that you might say yes and you might say no.

Cathy: There are times I can't tell you how turned off I'd be if someone said yes. Imagine that you come up to the lady of your life at seven at night, someone with whom you've never made love, and say to her I want to make love to you and she says yes, well, hell, I don't think that's how I want to get to it. What point is there in formulating the thing.

Christiane: With the come-on situation, that's not what's involved; it's about categories as totalities.

Catherine: Why couldn't we be completely laid-back when someone comes on to us?

Christiane: It really freaks me out to have someone facing me who doesn't see me as a person. It even freaks me out when I see it happening to someone else and I'm not in the picture, when I see another girl being hit on.

Catherine: Depending on how I'm feeling about myself at the time, when a guy starts looking at me, it can make me uncomfortable, I don't know where to look anymore, or, just the opposite, I can feel completely laid-back and things go smoothly, I watch the dude come over. Why at certain times it's okay and at others it's not, and yet it's the same thing that's happening. There are times when being looked at like that has no effect and other times when it freaks me out.
Evelyne: A girl came on to me in the street in May 1968, she almost ran me over with her 2CV, she stopped, opened the door, said "climb in," I said yes, I never saw her again.
Catherine: It's funny, the come-ons that are like all other come-ons and yet we say yes… I feel an inhibition and I would like to get rid of it: When someone comes on to me and also because I've never managed to come on to someone else, to simply say to someone that I want her, it's always made me feel like I'm about to jump from the third floor.
Christiane: Fear of failure is really inhibiting. I know that feeling too. That's why I tiptoe around so I can beat the heck out of there without being noticed.
Anne: What does fear of failure mean? Fear that you'll be rejected or fear of a relationship that you may not be able to get out of. All the more since, for me, given that I tend to put myself in a passive position, I find that the distinction between me coming on to someone and someone coming on to me is not very true; often, I'm the one who's ready, but it's as if I needed the other person to give me a formal agreement, a kind of institutionalization of the relationship by the fact that the other person is the one who makes a move… One thing that stops me in my tracks, especially with women, is the thought that I don't know how to make love; I have to find myself with someone who's in the position of initiator; it's a helluva block. Another thing, when you know the people, you're scared of destroying their system of relationships and then not being able to follow through. For example, a girl living with a guy, I have no desire to stir up shit, same thing for a guy living with a girl I know. When I don't know the people it's different. When you're not there expecting someone to fuck with you, when you're not running scared, then they don't fuck with you. Don't know what it is in my body, in my way of acting that has changed but now it's very rare that I get approached. It's not that I wanted to be picked up beforehand, just the opposite, it has to do with what's on my mind when I'm out walking, the obsession that I will be hit on or something else. I'm not often hit on now cause I'm okay with it happening. If it happens, I couldn't give a shit so it's no problem at all. When you're scared of being hit on, you're scared of your body,

especially since people always come up to you from behind, so you're expecting something and that changes your way of walking, and, bang, in that state of expectancy, a guy comes along, etc.

Evelyne: The whole system is so blocked. They never taught us how to connect with another person sexually. They told us about romance, parents in the day, they'd find the stud to go with the girl, etc. We learnt how to behave in society, but not in terms of sexuality, they don't teach us that. Since it's bad, no one talks about it, it's taboo… We have to develop our own system and it's a whole code. The winks, the dude who touches the girl in the street, all that stuff, maybe they're patterns, but they're there to replace something that doesn't exist. We think it's gross cause it's guys accosting us like that and we don't like guys. With guys it's different because I've developed such a strong system of defense against them since I was a teenager that right away they realize they're wasting their time, I'm not fuckable. With girls, I still have this attitude when I feel like a girl is coming on to me, I have a tendency to put up these defenses again because she's kinda acting like I've seen guys act. On the other hand, how do you approach a girl?

Anne: If fucking is really the aim of the come-on, I can't say that I ever have any desire to fuck someone I'm seeing for the first time.

Catherine: When a girl comes on to you, there's a sense of admiration that sparks your desire cause it's so rare.

Evelyne: At the Sorbonne, there was this girl who came on to me: We looked at each other, she winked at me, the next time I found myself sitting next to her, it was a real come-on, but it was so rare. It was before the movement, it was cool to find a girl like that.

Anne: Do you think the come-on is bad because you see it as an act of violence?

Evelyne: If it's a guy coming on to you by touching you on the street, I consider that an aggressive act. To me, it's a form of oppression: Because I'm a woman, he thinks he can treat me like that, touch me, say whatever he wants, like I'm an object.

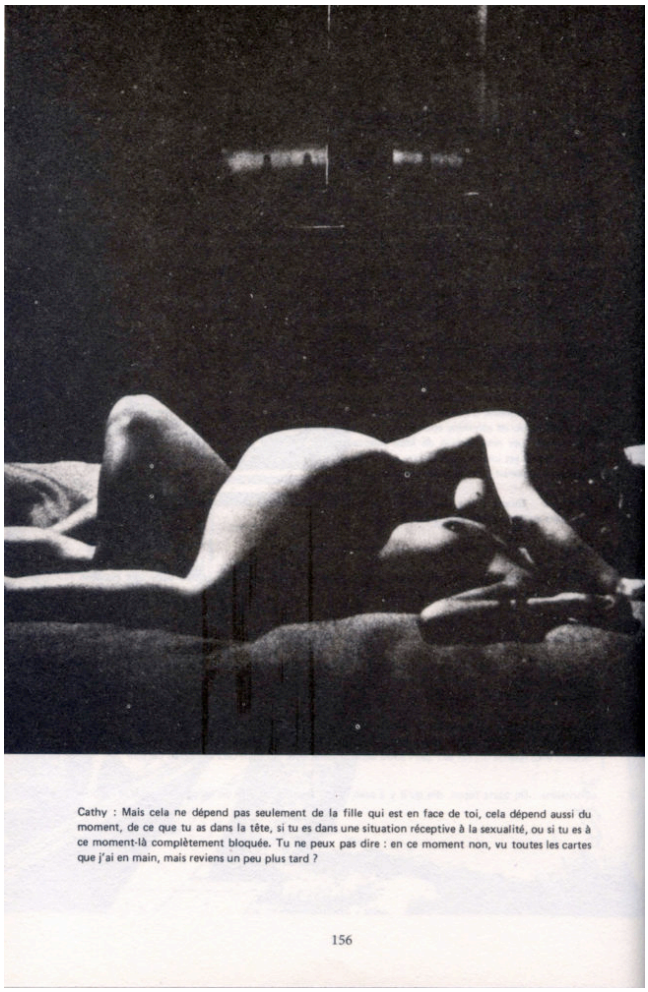
Catherine: What's hard about the relationships we have now is that all the signs can be read in so many different ways, there's no single code anymore, it's more like a code per person.

Evelyne: Personally I can't stand girls who use charm on me cause they want me to come on to them; I'm more receptive to a girl who comes on to me in a masculine way.

Anne: You may have an impulse toward several people you know and wait for enough signs from them to be for sure… It's a terrible problem of evaluation because you don't want to make a mistake, you don't want to force yourself on others, if you're the one who

takes the initiative, you get the sense that you might do violence to someone who's not looking for this at all. That's why I'd also rather adopt the "feminine," "passive" posture, of being in a position to act, but leaving the initiative to the other. I know that if I leave it to the other person, I won't feel that violence has been done to me.

Cathy: And do you think that there's no violence in forcing the other person into the position of having to act. Even if she doesn't force herself violently on you, she'll have to do violence to herself in order to make a move.



Relationships of reciprocity

Christiane: It's beginning to piss me off that there's this weird position dictating that one gives and the other gets. The case of reciprocity barely seems to have existed. It seems to me that all the cases we've been speaking of should be thrown into the trash heap of history. What interests me are relationships of reciprocity.

Anne: But they're mythical; out of the whole slew of people we meet and we ask ourselves questions about, they are very, very rare.

Christiane: That's not my experience and I wonder why that is, maybe it's my way of presenting myself, attentive rather than expectant or pouncing. When I meet people, if something happens, it happens between the two of us, nothing happens from one to the other.
Evelyne: That's what happened between Wanda and me, but it seemed to me really out of the ordinary: We met one night, got talking, continued the discussion at my place, found ourselves in the same bed because there was only one at my place at the time, then I began thinking I'd really like to make love with this girl, she was thinking the same thing, there was a real attraction, and then I touched her and that's how things went.
Christiane: Couldn't we lay down as a working hypothesis that this type of stuff is the real thing and that the other stuff is about obedience, conditioning, institutions, false stuff. As long as there's no relationship of reciprocity in actual fact, we shouldn't be making a move.
Cathy: It's awfully hard to see where the hunt ends and reciprocity begins, because it was the other person, because it was me?
Anne: When we talk about reciprocity, in the back of our minds is the idea that the two people who meet each other were predestined. There's another way of working the hypothesis, in terms of the way that you enter into a relationship with someone, and you can do this from a position of reciprocity no matter who you're entering into a relationship with.
Christiane: In my working hypothesis, predestination is universal: If it's not everyone that's because we're all in deep shit, separated by institutions, patterns, habits. Reciprocity can exist with someone on a specific point and on that point only.
Anne: When we say that, we're disregarding what we said before: that we're afraid of fucking, of being fucked, of entering into a sexual relationship. For there to be reciprocity on all levels, there's a whole slew of behaviors that need to be changed. In the many relationships I've had until now, there has very rarely been reciprocity from the outset. For example, I've been in love with a girl for a very long time; I felt particularly in love the night at the Mutualité; there'd never been anything physical between us; I have no idea whether it's reciprocal or not; before the movement, because I was repressing my homosexuality, I experienced this relationship as a fantasy rivalry. It's a bizarre relationship, where we don't speak much, because we don't want to touch on it, cause that would open up a can of worms.
Christiane: What stops a relationship from being reciprocal are the hangups, the questions we ask ourselves, our anxieties.

Cathy: Reciprocity can exist and the relationship can still be stuck.
Anne: But in such a situation, I'd tend to put myself in a waiting position and let the other person take the initiative.
Evelyne: We shouldn't treat sexual reciprocity as a separate case; you can have relations with someone on all levels.
Anne: For me the problem of reciprocity comes up as soon as sexual relations are more or less in the picture. That's when the shit starts, the inhibitions, the taboos, obsessions, lots of stuff that messes things up.
Evelyne: Why do we need a whole game to find out if another person wants to communicate with us sexually, when the question doesn't come up for verbal communication? When you talk with someone, you know the other person likes talking to you or she'd have left.
Christiane: Anyway, as soon as sex is in the picture, there's anxiety and you don't want the response to be no.
Cathy: But this doesn't only depend on the girl facing you, it also depends on the moment, what's in your head, if you're receptive to sexuality, or if you're completely hung up at that point in time. You can't say: right now, no, given the cards I have in my hand, but come back a little later?

Translated from the French by Gila Walker.

Footnotes

1. Translator's note: The noun "*la drague*" and the verb "dr*a*guer" are colloquial for an amorous advance, for flirting, generally for the purpose of having sex, and often but not only casual sex. As a verb *draguer* could be translated variously as to come on to, hit on, make a move, a play, or a pass. In seventies gay culture it is associated with the act of cruising.

2. French Women's Liberation Movement.

3. After the death of Georges Pompidou in 1974, Jean Royer ran for president on the platform of "moral order."

4. *Les Cahiers de Mai* was a journal created immediately after the event of May 68 and published until 1974. The aim of the publication was to establish connections between revolutionary workers groups. For this purpose, political meetings were organized bringing together activist workers in about fifteen factories, including Usinor's in Dunkirk.

5. See above, note 2.

6. A lesbian disco for women in Paris

Darkrooms and White Cubes: Cruising Pavilion in Conversation with Glass Bead

Cruising Pavilion

Initially conceived as an uninvited exhibition focusing on homosexuality and cruising cultures at the 2018 Venice Biennale of Architecture, the Cruising Pavilion has since mutated into a curatorial project, which, after a second show held in New York last winter, is preparing a third one this fall in Stockholm, at the National Museum Architecture of Sweden (This interview took place before this third show opened). While each of these shows is entirely different, they all pursue the same goal: exploring the many ways in which cruising practices have challenged and continue to challenge architecture—whether urban planning, established architectural discourses, or the conception of public spaces. Beyond its subversive origins in the Venetian context, the growing institutionalization of this project underlines the importance of a question that, in fact, has been raised from the outset: how to deal with the contradiction of wanting to expose practices that, most of the time, have emerged and continue to develop against and despite a public view from which they are trying to escape. In other words, how to exhibit subversion? The following conversation discusses the parallel and sometimes contradictory lines between the way cruising cultures are meant and seen to be challenging architecture, and the ways in which darkrooms and white cubes can be read as opposite spatial types.

Glass Bead: First things first: What is the Cruising Pavilion?

Rasmus Myrup: The Cruising Pavilion is a curatorial project focusing on gay sex, architecture, and cruising cultures. It is led by four friends: artist Rasmus Myrup, architect Octave Perrault, and the curator duo Charles Teyssou & Pierre-Alexandre Mateos. We are all based in Paris.

The group came together around the first exhibition we organized at the Venice Architecture Biennale 2018. The Cruising Pavilion was initially the name of this exhibition, which showed the works of over 20 artists and architects inside the warehouse-like project space Spazio Punch on Giudecca. The richness of the topic and the positive response we received convinced us to transform the project into an exhibition trilogy, with each edition taking place in a different city with different works. The second edition took place this winter 2019 in New York City at Ludlow38, the Goethe Institute gallery, after an invitation by curator Franziska Wildförster. The third and last one will open in September 2019 at Arkdes, the Sweden's National Centre for Architecture and Design, located in Stockholm, after an invitation by curator James Taylor-Foster. Besides the exhibitions, we also have participated in various talks and events along the way and are thinking of gathering everything into a publication after the show in Sweden.

CRUISING ~~*FREESPACE*~~ *describes a generosity of spirit and a sense of humanity at the core of architecture's agenda, focusing on the quality of architecture itself.*

CRUISING ~~*FREESPACE*~~ *focuses on architecture ability to provide free and additional spatial gifts to those who use it and on its ability to address the unspoken wishes of strangers.*

CRUISING ~~*FREESPACE*~~ *celebrates architecture capacity to find additional and unexpected generosity in each project – even within the most private, defensive, exclusive or commercially restricted conditions.*

CRUISING ~~*FREESPACE*~~ *provides the opportunity to emphasise nature's free gifts of light - sunlight and moonlight, air, gravity, materials - natural and man-made resources.*

CRUISING ~~*FREESPACE*~~ *encourages reviewing ways of thinking, new ways of seeing the world, of inventing solutions where architecture provides for the well being and dignity of each citizen of this fragile planet.*

CRUISING ~~*FREESPACE*~~ *can be a space for opportunity, a democratic space, un-programmed and free for uses not yet conceived. There is an exchange between people and buildings that happens, even if not intended or designed, so buildings themselves find ways of sharing and engaging with people over time, long after the architect has left the scene. Architecture has an active as well as a passive life.*

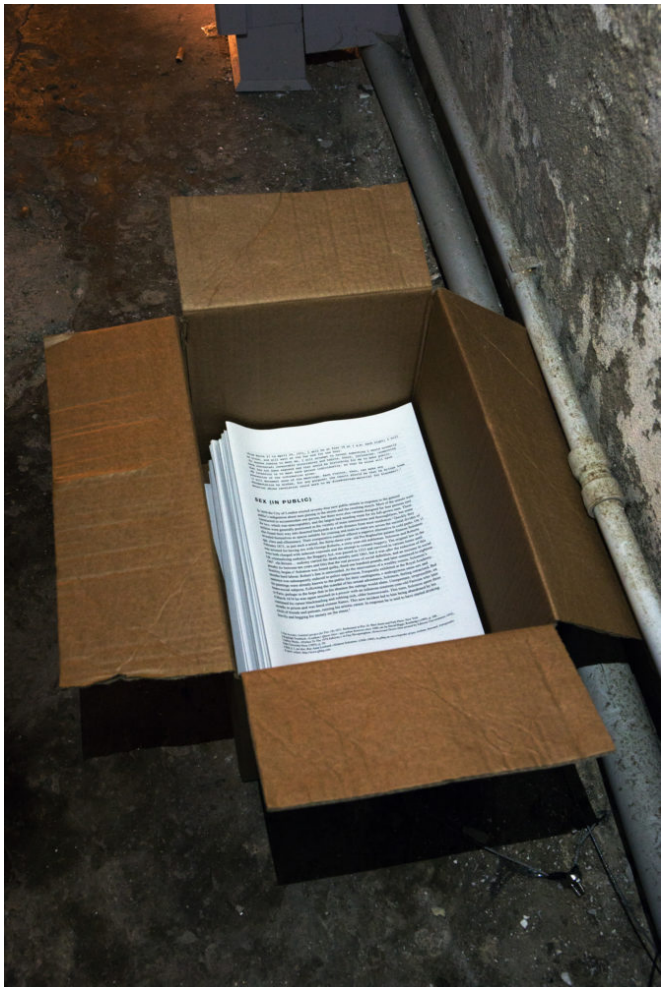
CRUISING ~~*FREESPACE*~~ *encompasses freedom to imagine, the free space of time and memory, binding past, present and future together, building on inherited cultural layers, weaving the archaic with the contemporary.*

"Cruising ~~*freespace*~~ manifesto", for Cruising Pavilion, Venice, 2018.

GB: In Venice, the Cruising Pavilion aimed to break into the famous biennale, notably challenging the notion of 'freespace,' chosen as the main theme of the entire exhibition that particular year. Used in the curators' manifesto as the cornerstone of architecture's putative tension towards indeterminacy, the notion of 'freespace' seemed to foreground a deeply liberal account of freedom, conceiving it in essentially negative terms (that is, freedom conceived as the liberation *from* constraints).[1] In an ironic twist that largely informed your curatorial intervention, you proposed what you called "urgent revisions" to this manifesto, simply replacing *freespace* by the term *cruising*. Beyond the joke and the critique that consisted in underlining how meaningless these utterances about freespace could appear, it seems that your revised version of this manifesto also called for a more positive understanding of freedom, more profoundly articulated to its objective conditions of possibility and, thus, to a questioning of freedom as empowerment. How much was the Cruising Pavilion a response to this particular biennale? How much was cruising used as a weapon against this liberal notion of freespace?

Octave Perrault: The Cruising Pavilion was not part of the official Biennale. And as a completely independent pavilion, it had to actively subvert the biennale and its culture. Considering the spirit and the subject of the show, it was also an integral part of the curatorial approach. Indeed, we had been thinking about doing projects on architecture, sex, and cruising in different ways over the few months before the biennale. The biennale provided a strong context for formalizing a show on the subject with a clear location, a date, a format (that is, a pavilion), and an established architectural culture to react to.
To answer your question, this first exhibition was more of a response to biennales in general and the architectural discourse at large rather than this specific one. The editing of the manifesto was one of the elements illustrating this. A couple of months before the opening, there was basically no information out apart from a few press statements by the curators and this weird freespace manifesto. I was told that the silence was a conscious choice made by the curators to somehow build expectations, which was also followed by the national pavilions who hardly communicated anything about their own shows. What a distorted marketing strategy! Strategy that to me, can be seen as a symptom of the weakness of today's architectural discourse. We are at a moment when architecture has lost its esteem because it is divorced from many contemporary debates. One of the greater challenges is to rebuild the legitimacy of its discourse in culture at large. And for that, we need to take clear and relevant architectural positions that can garner support.
Actually, the "Cruising ~~*freespace*~~ manifesto" might be more about contemporary architectural curation than a reflection on freedom. Freedom, liberty, liberalism, free market, light and space, generosity… What were the curators trying to say? The biennale's manifesto used the most general pseudo-poetic terms without much of a stance or question. There was little to agree or disagree with. Our edit simply said that it could be otherwise. If every architecture biennale was about one specific topic, clearly developed and problematized, a solid discourse could progressively emerge. I could imagine such a methodology working well with architects who are used to responding to a brief. Such a methodology could also establish a curatorial culture specific to architecture, which demarcates itself from its artistic model.
That being said, I would agree about freedom as empowerment instead of freedom as liberation from constraint. It is about a form of resistance that works within and against rather than about a search for an outside. This is very much aligned with contemporary theories of emancipation that have developed since post-structuralism, I would say. In fact, architecture is perhaps the only cultural domain where freeing from constraints

remains a dominant lexicon of action. Most architectural projects are still justified through the breaking or softening of walls, structures, orthogonality, materiality, order, etc.



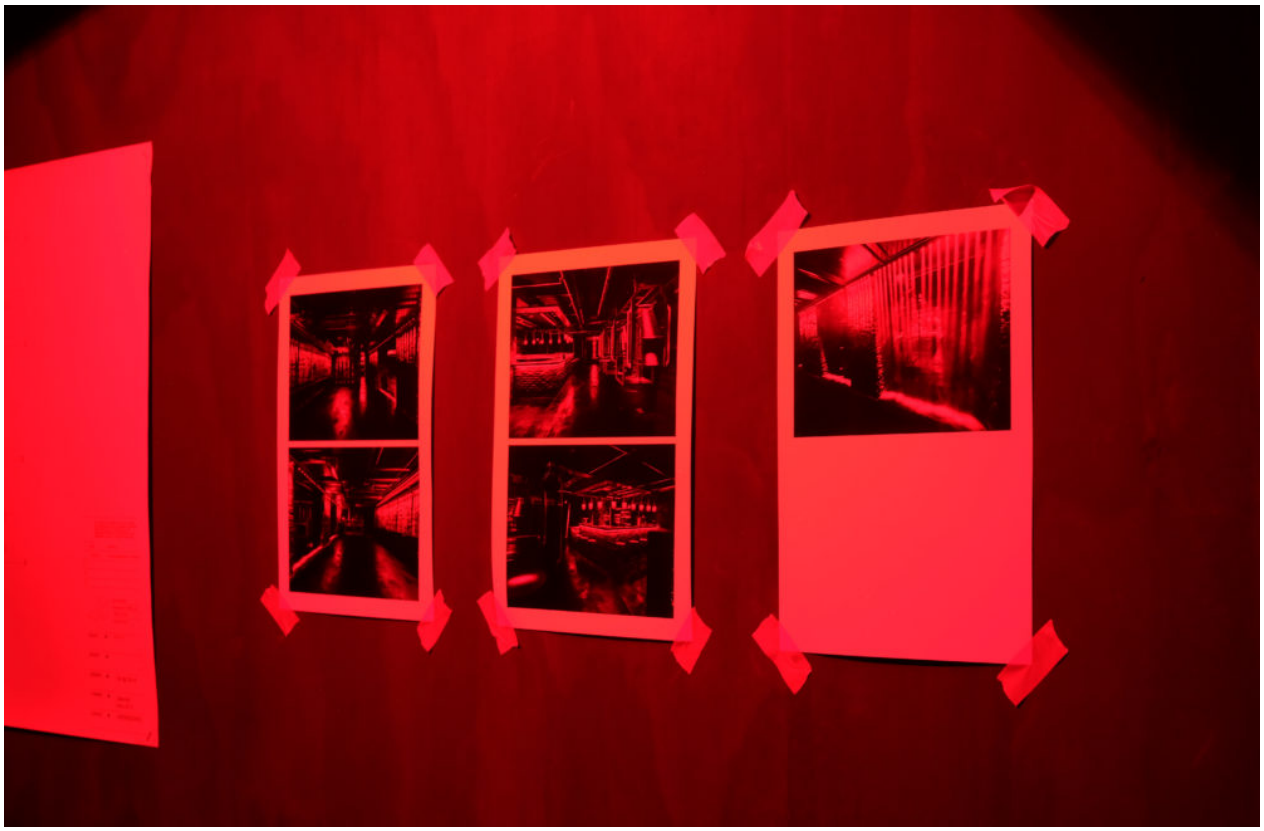
Henrik Olesen, *Pre-Post Speaking Backwards,* 2006. Courtesy Galerie Buchholz, Berlin, Cologne, New York. Installation view of Cruising Pavilion, Venice. Image by Louis De Belle, 2018.

GB: Far from any romanticization of cruising, you framed your reflection in relation to contemporary transformations that deeply affect its practice and experience: "Geosocial apps [you argued] have generated a new psychosexual geography spreading across a vast architectonic of digitally interconnected bedrooms, thus disrupting the intersectional idealism that was at play in former versions of cruising. Today, class, race and gender might be as regulated by the erotic surface of the screen as the architecture of the city." To what extent was your critique of 'freespace' articulated to one that could be launched against cruising in a context in which its practice seems increasingly neutralized and commodified by platforms that sometimes share more with Facebook than with the more subversive origins of cruising practices?

OP: Part of our position––at least mine––is to precisely refrain from such polarized frames of thoughts. The power of subversion that 'original' cruising enjoyed is real but it is also romanticized because it was also arguably more dangerous and criminalized back then. The neutralization and commodification of sexualities through apps is very real too, but that does not completely hollow their political potency; plus, there is the fact that they are now present and unlikely to be going away anytime soon. It is best to understand them and cultivate a critical engagement with them.

I truly hope that our exhibitions are explicit in this regard. We are not mourning a lost past nor simply embracing the present, but working with the tension between the two. Cruising is highly specific and everyone seems to have a different definition for it. We are conscious that we are talking about cruising in a limited manner, through a heavily European and North American lens, but we are actively working on balancing the positions with a variety of works that do not provide a uniform definition of cruising nor a complete history of it.

Your question about whether apps for sex are freespaces when they are at the same time very controlled, comes down to asking whether we can even speak of an architecture of cruising. The image of cruising as a resistance to normative totality does not really lend itself to architecture, which is the art of ordering things in space, and thus by definition very un-queer. Looking for an architecture of cruising is already a polemical question. Tom Burr's and Henrik Olesen's texts on cruising might be the ones most directly speaking about cruising as both a free and dangerous practice in reappropriated spaces. Andreas Angelidakis's DIY gloryhole labyrinth manual shows cruising as a playful game. The bathhouse by Studio Karhard shows that cruising has also been subject to a form of institutionalization with the creation of dedicated designed spaces that interestingly turn the aesthetic of a 'wild' form of cruising into a design language. And Andres Jaque's videos are at once about the ways dating apps are used by governments to target gay men in certain areas of the world and about the way dating apps are the medium through which gay refugees have managed to accelerate the reconstruction of their lives.



Studio Karhard, *Boiler Club Extension,* 2015. Photos by Stefan Wolf Lucks, courtesy of the architects. Installation view of Cruising Pavilion, Venice. Image by Augusto Maurandi, 2018.

One of the curatorial challenges of the upcoming show at ArkDes in Stockholm, the National Architecture Museum of Sweden, is to maintain and convey the complexity of these perspectives. The exhibition needs to be strongly stating what cruising is because it will be very alien to a large majority of the audience–kids and families–but it also needs to highlight the complexity and nuances that the topic deserves. What will be radical to many of them will be common sense to others. The ambiguity you point out with regard to digital technologies also concerns our curation in general: Is it right to expose cruising this much? Are we helping or are we complicit? Are we capitalizing on it? Can and should we define cruising, even? We ask ourselves these questions all the time and they are a driving force behind the project. The approach we always follow is that it must be done well and to the right extent.

This issue has been particularly vivid with regards to non-men cruising practices and their architecture. The very premise of this question is debatable. There is much less known material, and we are personally not in a position to say much, and yet, at this point, it has become one of the most interesting and lively frontiers in the project. People have been engaging with it more than any other points raised by the exhibitions, both

intellectually and by actively trying to set up real spaces. For example, the parties that Maud Escudié is now organizing were partly triggered by the conversations around the project, including one between her and Hannah Quinlan and Rosie Hastings during a talk Pierre-Alexandre and Charles did at FIAC. This is why we showed her party flier in the New York exhibition. The works related to gay male spaces and practices were more about re-reading certain histories or revealing them. They provided extremely valuable context but generally did not have the same urgency as certain works that expand the edges of what cruising might be, such as Shu Lea Cheang's film for example. Overall, if the Cruising Pavilion participates in furthering the subversiveness of cruising beyond its traditional definition, we are doing a defendable job, I believe.

Shu Lea Cheang, *I.K.U, I-robosex*, 2001. Film. Courtesy of the artist. Installation view of Cruising Pavilion, New York. Image by Jason Loebs, 2019.

GB: When presenting the first Cruising Pavilion, in Venice, you notably stated that: "Somewhere between anti-architecture and vernacular, the spatial and aesthetic logic of cruising is inseparable from the one of the proper metropolis. Cruising is the illegitimate child of hygienist morality." This conception stems from a historical reading of cruising as a practice that, in response to the forced marginalization of homosexuality by the architecture of bourgeois domestic spaces, developed in the interstices of cities whose

modernization also tended to increase their overall legibility, transparency, and discipline (as notably emphasized by Michel Foucault in *Security, Territory, Population*).[2] Emphasizing the many ways in which cruising resisted this modernization, you also underlined how it culminated in the baroque figure of the labyrinth. Yet, in your exhibition, you showed the work of Pol Esteve and Marc Navarro, whose drawings of Barcelona darkroom plans rather emphasize how much these spaces are often the product of an extremely clear logic of partition. These plans seem to share almost nothing with the common figure of the labyrinth. Do you see this architecture as simply registering a profound transformation of the sexual practices historically associated with cruising? Or do you see in it the potential, against the established architectural discourse, to ground a non-obvious yet resolute emancipatory architecture of sexual desire? In other words, to what extent do you think we can see these plans as an alternative proposition, beyond the idea that cruising would be somehow restricted to the subversion of an existing moral and normative order?

Pol Esteve & Marc Navarro, *Atlas of Plans: Barcelona Dark Rooms,* 2007. Digital print, 841mm x 1189mm, Unlimited edition. Courtesy of the architects.

OP: Our reading of the figure of the labyrinth in the darkroom plans and cruising plans at large is anchored in a political history of the city which, I guess, would indeed be Foucauldian. I do not know if the labyrinth is baroque, but I can definitely assure that, architecturally speaking, labyrinths are not common. On the contrary. The greater majority of the cities we inhabit have mostly been built after the 18th century through large scale architecture projects mixing social reform and real estate developments. These were marked by a search for order in all its forms—whether moral, social, economic, or political—and spatial order was one very important means of achieving that. This is particularly visible in the reforms of the London slums in the middle of the 19th century and the reform of hotels in pre-war New York City; the smart city reforms that are now taking place across the world abide by it too, according to the dominance of efficiency and organization in its lexicon (even chaos is about organization now, in that context).

The labyrinthine quality of architectural spaces has been one of the main targets of such architectural reforms, especially at first in the domestic sphere. Disorderly rooms and plans were said to be breeding misconduct, because they resisted surveillance and also enabled unholy interactions between inhabitants. These spaces were neither living nor working quarters, neither bedrooms nor bathrooms, neither public nor private. Women, men, children, siblings, elderlies, animals, everyone was constantly interacting, with little intimacy, sharing beds and baths, and had little control over their privacy, and little awareness and value for the proper (bourgeois) private etiquette. Sex was much less of a private affair than a public one for everybody, husbands and wives included, because there was no intimacy at home. Also, homosexuality was not criminalized in the same way, and marriage was more about lineage than romance. Alongside labyrinthine architecture, the other architectural demons that had to be solved by moralist reforms were darkness and fluids, both bodily and urban. City health and body health have often been interchangeable analogies.

Shu Lea Cheang, *I.K.U, I-robosex,* 2001. Film. Courtesy of the artist. Screengrab by Cruising Pavilion.

What is extremely interesting architecturally is that visibility, orientation, and fluids are precisely at the core of cruising architecture. Toilets and bathhouses are dedicated spaces for bodily urban fluid management, parks are naturally labyrinthine spaces that are hard to surveil and often most active at night, and darkrooms deploy all of these attributes through architecture and design, even by subverting the codes of modernist machinic morality into a fetish. Darkness, corners, nooks, passages, wet surfaces, lubed devices: all of them are using the aesthetic tropes and logic of the modernist city, but precisely to facilitate activities that have been designed out of the city. The plans of Barcelona darkrooms drawn by Pol Esteve and Marc Navarro in 2007 are probably the best work illustrating this argument.

So, if the cruising labyrinths are surely made of partitions and materialities that belong to the modernist architectural lexicon, they articulate them in a way that is not furthering the dominant biopolitical project in that sense. And to me, one of the most important points in this regard is that the ubiquitous motif of the dark labyrinth in male cruising seems to have crystalized through practice rather than theory, like a sort of common-sense strategy of resistance, which is why we introduced the idea of a cruising vernacular and that we make exhibitions where you get lost, cannot see the artworks, and have to somewhat engage with them non-discursively. At least we try to point at that.

GB: You have stated numerous times that one of your driving hypotheses about the architecture of cruising is that it shares a lot of similarities with the architecture of exhibitions. In fact, it can be said of both that they consist of intense 'biopolitical' sites: be it by regulating the phenomenological access of spectators to artefacts, or by maximizing the regime of encounter between bodies and desires, they both act as spatial frames and physical stages for the political construction of subject-object relations and are, as such, directly bound to power and the fabric of its social order, whether by instituting or subverting it. You have notably framed your project in analogy with the way in which the abstract modern topos of the garden was appropriated in a seminal exhibition like *Theatergarden Bestiarium*,[3] by concretely translating the "art of space" ushered by the architecture of cruising into the architecture of your exhibitions. While *Theatergarden Bestiarium* aimed to detect the emergence of the figure of the modern spectator in the baroque culture of 17th-century Europe by grounding its political formation in the development of the theater stage and the architecture of baroque gardens, the Cruising Pavilion seemed to look for producing a certain subject by exhibiting the emancipatory uses bodies can make of the specific architecture of darkrooms. How does your project make use of the codes and norms ingrained in the architecture of exhibition to bring forth such subversive, counter-hegemonic uses, without merely aestheticizing them?

Pierre-Alexandre Mateos & Charles Teyssou: Conversely to what you may suggest, the aestheticization of architectural codes attached to the darkrooms might be the most subversive act of the exhibition. To explain this point, we should briefly detail the cultural construction of manliness as an architectural fetish by darkrooms. By performing a hyperbolic version of masculinity through the use of rough concrete, bricks, wires, military pattern, and so on, these spaces render such features into drag king ornamentation. When you go to The Eagle (New York), Le Bunker (Paris), or Ficken 3000 (Berlin), it is very clear that the translation of masculinity in architectural terms is operated through the idea of opulence, décors, and postures. As such, darkrooms might be the best spatial device in order to approach architecture as a biopolitical theater in which sexuality and gender is rendered as a pure drag king performance. In the essay "Curtain Wars,"[4] Joel Sanders speaks in detail about the cultural conflict between the architect and the interior designer, the two extremities of the axis that separate manliness and womanliness, authenticity and superficiality, exteriority and interiority. This dialectic found its apex with modernist architecture and alpha figures such as Le Corbusier or Mies Van Der Rohe. We believe that the design of darkrooms deeply

repudiates this binary by pushing such architecture to a point of critical campiness. One of the first editions of Cruising Pavilion was to foreground such thinking by indeed aestheticizing the codes and norms of darkrooms. That said, the connection we made with the exhibition *Theatergarden Bestiarium* was a way to investigate the genesis of cruising and public sex practices in relation to modern spectacle. Garden, theater, and cinema have been historical sites of cruising. We could think of the labyrinth in the garden of Versailles Castle as a model for sex clubs. *Theatergarden Bestiarium* also focused on modern spectacle as a technology of production of subjectivity. In that line of thought, darkrooms and spaces created by dissident sexualities have embodied a counter-hegemonic force to collective sites of subjectivation such as mainstream media and social institutions. Indeed, if we follow William Burroughs's or J.G. Ballard's thoughts that drugs and the new media landscape have been the structuring forces of contemporary subjectivity since the fifties, one could say that some sex-clubs have been intense laboratories for the production of dissident biopolitical fiction. They enabled the invention of new ways of desiring, loving, and living that did not obey the hetero-patriarchal model of reproduction by the use of chemicals, porn, and sexual paraphernalia. Ideally, Cruising Pavilion wished to bring such sexual subcultures and their revolutionary potentials to the foreground.

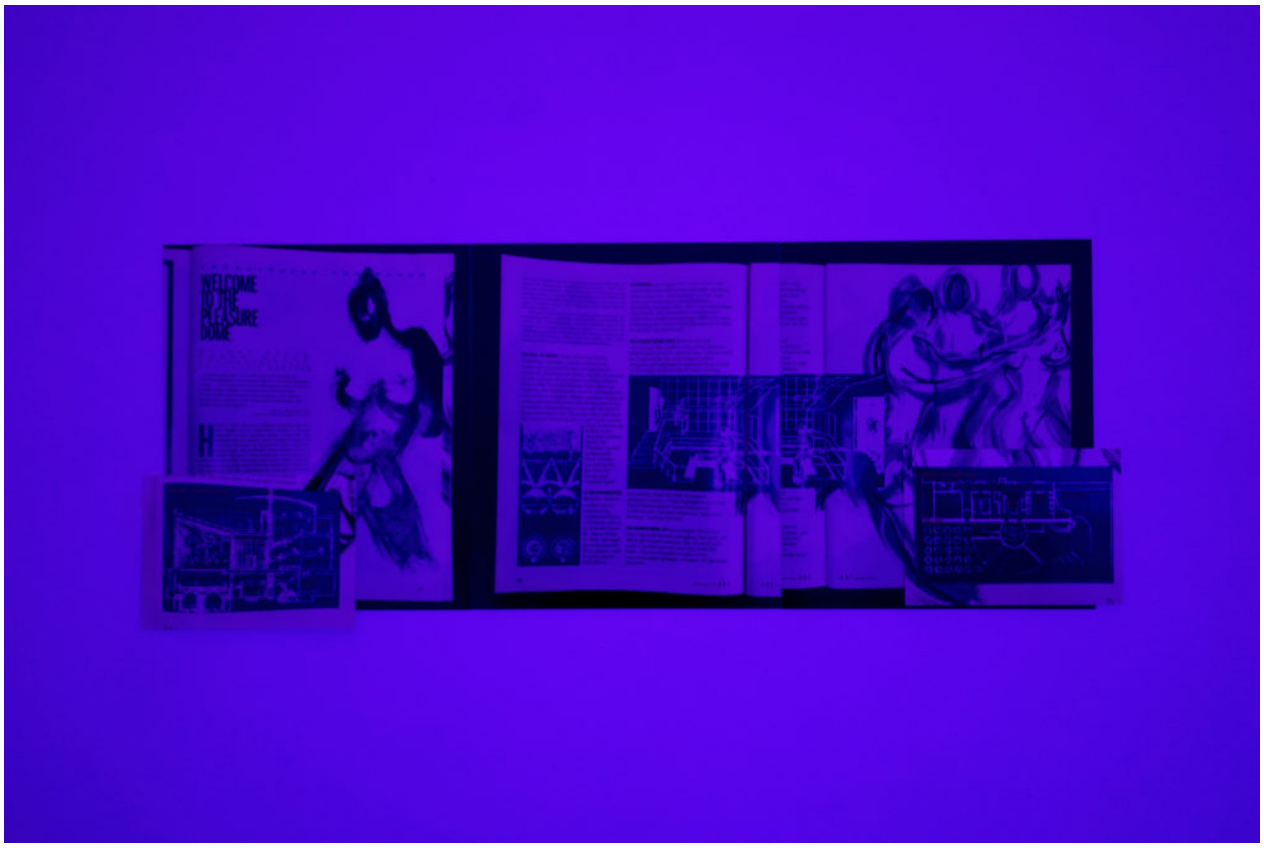
OP: With regards to the architecture of cruising versus exhibition design, we have noticed that the only spaces sharing similarities with cruising spaces are exhibitions. This comparison does not apply in terms of scale, but there is a clear parallel in terms of their spatial articulation, especially with designs for exhibitions such as *Les Immatériaux* by Jean-François Lyotard at the Pompidou Centre[5] or the more recent design for the Stedelijk's permanent collection by OMA. Less than a real historical argument, I see this analogy to be particularly useful because both are playing with circulation, interaction, visibility, exhibition, discourse, desire, etc. There is a shared lexicon that I like to read in analogy between spatial layouts, but there is also a strong opposition in terms of brightness. The white cube contrasts with the darkroom. The discourse of the institution relies on light when that of counter-discourse needs darkness, which can also be called non-verbal and perhaps non-visual. I am not yet sure if this can be a point to develop beyond a mere observation, but it has nonetheless been a very useful operative idea for our exhibition designs, especially with regard to our shows 'exposing' and 'casting light' on cruising—that is, institutionalizing it. In short, we make exhibitions that you cannot see on purpose.

Hannah Quinlan & Rosie Hastings, *Gaby,* 2018. Digital video, 7:55. Courtesy of the artists and Arcadia Missa. Screengrab by Cruising Pavilion.

GB: While cruising was never explicitly and publicly mentioned in relation to built projects, your exhibitions display built projects in which some form of thinking about cruising practices was involved. Such an act seems to point to a contradiction that attempts at exhibiting sub-cultural or subversive practices are obligated to confront: namely, the problem residing in the fact that making public movements or practices whose subversive nature is also bound to remaining hidden from the power structures they subvert can also give traction to the way in which these structures can repress or normalize them. In the particular case of your exhibition, we could first identify this tension between the darkroom, which mainly operates despite the public gaze, and the white cube, which, understood as a generic regime of exhibition, functions on the contrary by virtue of this public gaze. If one could say in experiencing your exhibitions that it everts the museological politics of visibility, it also seems to do so by paying the price of entering this regime. Could you tell us how you theoretically and practically navigate this contradiction?

PAM & CT: The history of cruising is embedded within the persecution of homosexuals. In certain geography and for a majority of people, cruising is not a choice but the only way they can live their sexuality. For others, clandestinely, anonymity, and secrecy has become a sexual trigger. Guy Hocquenghem rightly emphasized the localization of

homosexual phantasms in the very imagery of its persecution: “Why toilets, insalubrity and darkness constitute the framework of gay desire? Why those who have decided to come out of hiding continue to project their excitement in the miserable places that the system condescends to allow them and where the police provoke them?”[6] By pointing to this, we wish to emphasize the complexity of desire and its resistance to unequivocal understating in relation to power structure. Moreover, the subversive aspect of cruising does not evaporate when lighted by an exhibition, just as its counter-hegemonic power is not automatically communicated to every person cruising. In certain countries such as the Netherlands, you have parks reserved for cruisers with a rainbow signalization encircling these sexual zones. The effect of such institutionalization is ambivalent as it accepts as well as monitors a practice at the same time. With regard to the question of the dark cube versus the white cube, we wanted to highlight series of art practices that had interrogated the possibility of curating radical sexualities. Several questions surfaced in our mind during the inception of the project: How can dissident desire be expressed without being institutionalized? How can dissident sexualities retain their power and their capacity for transgression without being commodified? Our conclusion was that they do not belong to art institutions or museums. The social order that has founded these institutions as well as the very museification process opposes the idea of exhibiting sexual countercultures. Yet some of the artists featured in the shows—such as Lili Reynaud Dewar, Tom Burr, Henrik Olesen, or Monica Bonvincini—have articulated their practices around this very contradiction. Their work either shed light on a sexual history of art written in the shadow of the master figures or questioned the libidinal functioning of the museum.

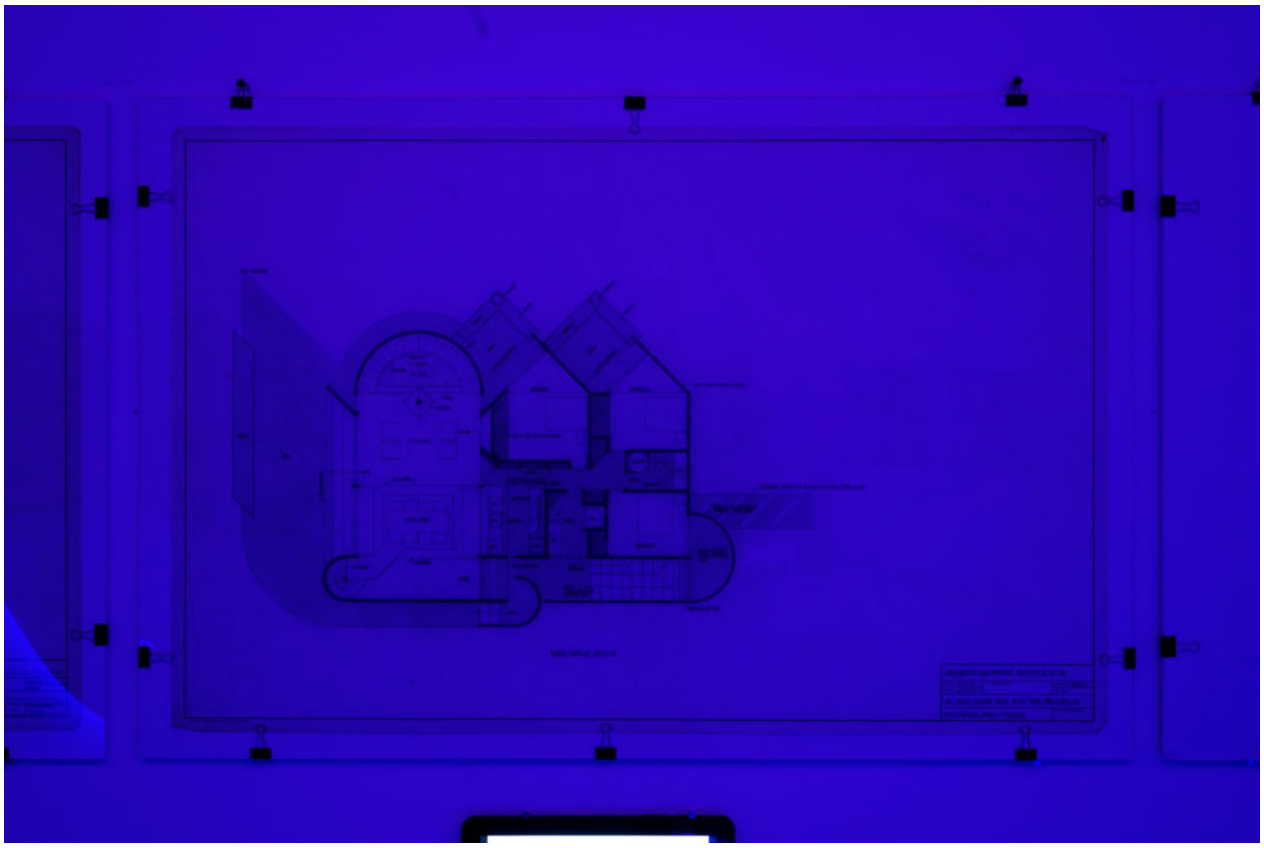


Ann Krsul, Amy Cappellazzo, Alexis Roworth & Sarah Drake. "Lesbian Xanadu", *Out magazine,* 1992. Magazine and print. Courtesy of the artists. Installation view of Cruising Pavilion, New York. Image by Jason Loebs, 2019.

GB: In the research leading up to the selection of artistic contributions for the Venetian version of your project, you said that you were notably interested in the connection between Minimal art, BDSM, and architecture, arguing that "masculinity, theatricality and the emphasis of non-verbal language are notions shared between these two fields." It can indeed be said of Minimalism that it retrospectively made explicit a constitutive aspect of the modern experience of art in general, that is, the double and reciprocally referential presence of the aesthetic object as *thing* and *sign*, its "stage presence." Seen in this way, Minimalism is also the art that most intensely foregrounded this presence in strongly anthropomorphic terms, stressing the bodily conditions under which an aesthetic event can be said to take place. How much does the connection you draw between Minimal art, BDSM, and architecture point towards such an emphasis on the embodiment of the exposure to artworks, or what we may call an *erotics* of aesthetic experience?

PAM & CT: Unfortunately, the budget limitations we had to work with in the different iterations of the Cruising Pavilion did not allow us to develop this connection on an experiential level. Moreover, the idea to delve into a general discourse that would take on

Michael Fried's essay "Art and Objecthood"[7] in which he criticized the "theatricality" of Minimalist art in order to develop an erotic of the aesthetic experience was not our goal. The primary aim of the Cruising Pavilion was not to speak about art via the lens of cruising or art about cruising but about cruising culture itself through different cultural artefacts that seemed to us pivotal in understanding this counter-culture. Yet, via the research of Monica Bonvicini and Tom Burr, we wanted to draw the critical connection between the supposedly immaculate formalism of Minimalism and the BDSM culture. From Robert Morris, with his advertisement for his Castelli-Sonnabend exhibition published in the April 1974 issue of *Artforum*, to Ian White's exhibition of Richard Serra's HANDS video at the Berlin sex club Lab.oratory in 2008, the idea was to mock the alpha male authority that innervates minimalist aesthetic.



Plan of the Stuart Roeder House, Fire Island Pines, New York, 1973. Drawing on architecture paper Courtesy of the Horace Gifford Archive. Installation view of Cruising Pavilion, New York. Image by Jason Loebs, 2019.

GB: In contrast to the Venice exhibition, *Cruising Pavilion, New York* held recently at Ludlow 38 explored what happened to the libidinal history of club culture in NYC since the sixties. A notable precedent you excavated is the Ansonia Hotel, founded in 1968 by Steve Orlow, which you described as a "sexual power plant" comprising "a dancefloor, a cabaret lounge, sauna rooms, steam rooms, a roman swimming pool, an upscale

restaurant, a hair salon, 400 individual rooms, two large orgy rooms, and an STD clinic." The difference between what it represented and made possible when founded in 1968 and what has happened to cruising and sex in NYC since then grounds your call for the need, following Paul B. Preciado's words, to "perform increasingly intricate gender cut-ups, build sexual constructivist montages and appropriate body normative dating apps to create new forms of queer situationist derives."[8] How would you situate your role as curators in relation to this call? How would you describe the role that exhibitions like yours can play in reinvigorating this culture, involving, in your own words, the notion that "cruising is not obsolete and that public sex remains a laboratory for political futures and spaces"?

PAM & CT: Firstly, we have to say that cruising does not need us in order to be reinvigorated. It is massively practiced and its contemporary mutations do not kill its original ethos even though they modify it. Concerning the role of curator in regard to the call for hacking gender, technologies, and urbanism, we think that the exhibition space should be a site for the flourishing of radical alterities, a space of physical and cognitive rush. Pierre and I are, for example, very attracted by the experiments of the early 20th century. The Constructivist theater of the early 1920s by Vsevolod Meyerhold and Alexander Tairov, for example, has been the crucible of the modern spectacle developed later by animation parks or the Hollywood cinema industry. The Pavilions of El Lissitzky, the Roxy's production for New York's Radio City Hall, or Herbert Bayer's designs for exhibitions, such as *Road to Victory*,[9] are a few examples of collaborations between the pioneers of metropolitan entertainment and avant-garde which led to the development of phantasmagorias that embraced technological curiosities, performances, and exhibition design—sometimes all together. Ideally, we think that an exhibition should provoke an altered state of mind and assume responsibility for both pleasure and knowledge, dream and horror.

OP: I feel very aligned with Preciado's quote even though in practice I have a rather straight sex life. Also, I think that there are great lessons to learn from the histories and the strategies that led to 'subaltern' architectures. Architecture has been seized by dominant normative forces, but it can precisely be deployed against it for that reason. The few 'sexual power plants' we talk about are probably some of the best examples. I see the Continental Baths as providing a relevant variation of Rem Koolhaas' Downtown Athletic Club.[10] This work on cruising is an attempt to advance the greater urgent contemporary questions regarding gender in architecture, especially in terms of forms and design. If all the architecture we know structures genders in a way that must be

undone, what do we design? Public/private; light/dark; inside/outside—they are all subject to that gendering. So what do we target, what do we subvert, what are the references and the words that should or should not be used? The methodology of Preciado should be deployed by architects and everyone, beyond the realm of queer avant-garde, in every single decision they make.

Interview conducted for Glass Bead by Jeremy Lecomte and Vincent Normand.

Footnotes

1. Yvonne Farrell and Shelley Macnamara. "Freespace," 2017. See here. Accessed 10 July 2019.

2. Michel Foucault. *Security, Territory, Population: Lectures at the Collège De France, 1977-78,* 2004. Edited by François Ewald and Michel Senellart, Translated by Alessandro Fontana. Palgrave Macmillan, 2007.

3. *Theatergarden Bestiarium.* 1989, MoMA PS1, Long Island, New York; Casino of Exhibitions, Seville; and Confort Moderne, Poitiers.

4. Joel Sanders. "Curtain Wars." Harvard Design Magazine 16. See here. Accessed 10 July 2019.

5. *Les Immatériaux.* 1985, Centre Pompidou, Paris.

6. Guy Hocquenghem. *The Screwball Asses,* 1973. Translated by Noura Wedell. Semiotext(e) edition, 2009, p. 13.

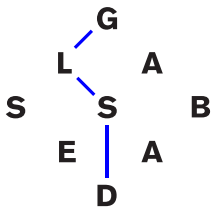
7. Michael Fried. "Art and Objecthood." *Artforum* 5 (10), 1967, pp. 12–23.

8. E.N. For the original sentence on which this one is based, see Paul B. Preciado. "Architecture as Practice of Biopolitical Disobedience." *Log* 25, 2012, p. 134.

9. *Road to Victory*. 1942, MoMA, New York.

10. E.N. The Downtown Athletic Club is a skyscraper in New York, famously described and praised by Rem Koolhaas in *Delirious New York*. See Rem Koolhaas. *Delirious New York,* The Monacelli Press, 1978.

The Cruising Pavilion is a curatorial project focusing on gay sex, architecture and cruising cultures.



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Machines and the Ethics of Miscegenation

Louis Chude-Sokei

In his controversial *Love and Sex with Robots* (2007), international Chess Master and renowned Artificial Intelligence expert David Levy strikes timely and telling cultural and technological parallels in this declaration:

> *When robot creatures are generally perceived as being similar to biological creatures, the effect on society will be enormous. It will be as though hordes of people from a hitherto-unknown and far-off land have emigrated to our shores, a people who behave like us in many ways but who are very clearly different.*[1]

That he establishes these parallels so easily has been less controversial than his book's assumptions of and possible impact on gender relationships, and his nonchalant relationship to ethics. However, the ease of these parallels and how natural they are to even the most casual reader is worth examining. As argued here, it is through these facets that we can make sense of how and why the very question of *ethics* has become central to public conversations about human relationships with machines.

Racing the Singularity

The history of technology, from industrialization to cybernetics, from robotics to AI, has in fact been replete with this type of casual parallel between humans and machines, non-whites and robots, technology and social, cultural "others." The history of Science Fiction has served to rationalize and naturalize those parallels in such ways that issues of race and difference—including sex and immigration, as Levy reminds us—are central to

the genre's software, so much so that they always already make sense in our consumption of such narratives. It is not important for the author to grasp how remarkable it is that the primary template for understanding robots is that of race, sex, labor, and immigration, because this has always been necessary. The real-world impact of these metaphors has become so naturalized as to be culturally invisible. This, after all, is the logic of metaphor: in making connections that already make sense, metaphor erases the historical tensions that make them possible and continue to give them charge.

Rastus Robot, "the mechanical negro", developed by S.M. Kinter (pictured here re-enacting Swiss folk hero William Tell), 1931.

Most important here is the fact that Levy narrates through sex, race, and robotics what we increasingly call "the singularity," after futurist/technologist Ray Kurzweil: that apocalyptic moment where machines equal or transcend humans in their cognitive abilities and, perhaps, social value; that moment that has fueled science fiction from its origins, in the work of writers such as Samuel Butler and Karel Capek. These authors, with their "revolt of the robots"/"rise of the machines" trope in the wake of Mary

Shelley's *Frankenstein; or the Modern Prometheus* (1818) and a lesser-known story like Herman Melville's "The Bell Tower" in *The Piazza Tales* (1856), shape the genre insofar as it grew directly out of 19th-century anxieties about slave reprisals, fears of colonial resistance, and 19th- and 20th-century terror of labor insurrections.

In our moment, however, the singularity is defined and produced largely by what Black British theorist/artist and notable Afrofuturist Kodwo Eshun calls the futures industry—"the intersecting industries of technoscience fictional media, technological projection and market prediction."[2] Taking Eshun's perspective in which race is central to how we imagine the future, what if we do not depend on this industry and its distorted sense of the future as inevitable and instead draw from that growing cluster of perspectives (I hesitate to yet call it a discourse) called Afrofuturism to make sense of the singularity? Rooted in the historical experiences of black peoples in and after slavery and colonialism, there is an eschatology there that removes us from that turgid binary of a corporate future and an allegedly transcended past. It suggests this: What if the apocalypse has already happened? What if, as musician and self-styled prophet Sun Ra would have it, this is already after the end of the world? What if the anxiety that many have about the future—with sentient machines and an Artificial Intelligence that dwarfs human conceptions of God, state, or infinity, and that also promises pleasures and freedoms dwarfing any we have previously known—is merely déjà vu?

There is something liberating in this take on time. It reorients our thinking away from a fear of the imminent to an acknowledgement of immanence, of being already entangled with the repercussions of that fear. It removes us from the rigidity of state sponsored techno-utopianisms and situates temporality in the more familiar though deeply unsettling realm of ongoing cultural anxieties and longings. This reveals that in the context of technology and its corporate futures, there is no Kurzweilian singularity on the horizon, no decisive moment when "humans" transcend their "biology" and technology outstrips human intelligence or when machines surpass human capacity. Or rather, that there is nothing singular about that singularity, hence the fact that black responses to apocalypse are often characterized by a familiarity that verges on blasé. This is because for us the world has already ended. To paraphrase Samuel Delany, the great Black Science fiction writer/critic and theorist of unspeakable, border-crossing desire, apocalypse has come and gone and we are just grubbing in the ashes.[3]

This eschatology matters because Levy's future, like Kurzweil's or Elon Musk's or those still driving much of the technological development in the West, is merely an echo of an earlier but no less momentous transformation that we have lived with for long enough to

forget it had an origin. It is a transformation we recall differently depending on our placement on the human/inhuman divide. From differential positions, that first singularity allowed either a gaining or a losing of power once the boundary between the two categories began to smudge and once the social structures that enabled them began to bear the brunt of challenges to their legitimacy.

With Afrofuturism in mind, then, the imminent moment when machines become citizen, separate and/or equal, or when things become people and emigrate to our shores, will merely reiterate a not so distant past. This is one where blacks, reduced to object status, denied souls and intelligence, poised by the logic of slavery between beast and automaton, between animated tools (as Aristotle described slaves) and dark prosthetic, became and merged with human being.

Sex, Race, and Robo-ethics

We should not forget that this historical transformation was greeted much like the Kurzweilian singularity, with the fear and fervor of apocalypse, particularly when it became clear that the political narratives and structures of racism were erected as much by scientific notions of difference as by the need to police desire. Perhaps of greatest significance here is the merging part and the elaborate sexual or reproductive mythos suggested by all talk of blending, assimilation, and socio-cultural intimacy. We have been here before. Levy recognizes this in his 2016 follow-up lecture, "Why Not Marry a Robot," which quite naturally tilts his interest in human/machine intimacy and its subsequent cultural impacts and transformations towards miscegenation.[4] This should be no surprise given the last generation or two of "cybertheory" and "cyborg feminism" and the emergence of "robosexuals" as a social type: one cannot fully contemplate human/machine hybrids without the process by which hybrids are generally made—sex.

"Why Not Marry a Robot" argues that the justification for human/robot marriage can be, should be, and ultimately will be sourced in interracial marriage. Central to Levy's argument is the fact that the prohibition of such relationships was ultimately due to the belief that race implied a difference in biological status or species being, i.e., s/he was not human, or a legal person. Such prohibitions—as with same-sex marriages, he argues—will soon be culturally outgrown precisely in the way that anti-miscegenation laws and laws against interracial marriage have been. This use of race is not simply metaphoric, and not casual in the way that so many parallels between race, gender, and other forms of otherness can be. Interracial marriage is rooted primarily in the context of the earlier singularity, when blacks in particular were still considered inferior, at worst

objects or animals and at best a lesser form of person. As an outcome of that singularity, interracial marriage signified a legal and moral redefinition of social and biological categories, which in Levy's view will serve as a precedent in perpetuity.

Levy's thinking is even more eccentric than this, and therefore more helpful in making sense of the increasingly difficulty to untangle historical and conceptual thickets of race, sex, and machines. His goal is not to just enshrine the human's right to love or to see love as a primary sign of "the human," but to protect and therefore assert the robot's right to choose—or to be accurate, to if not choose, to not reject. "Humanness" is irrelevant here. Relation is what determines intimacy and what will demand social recognition. Intimacy will generate the claim on personhood. Intimacy is that most ethical and transformative of spheres and its range of affective realities are what shuffle and redefine social and biological categories via desire (i.e., by virtue of my love—and the power to legally render it so—this "thing" becomes human. It is worth keeping in mind that this merely restates something that we find more historically agreeable: by virtue of my disdain—and my power to legally render it so—this human becomes "thing").

BINA48 (Breakthrough Intelligence via Neural Architecture 48), robotic face combined with chatbot functionalities, owned by Martine Rothblatt's Terasem Movement, and modeled after Rothblatt's wife. Hanson Robotics, 2010.

These debates may be less focused on robotics than Levy acknowledges, but they are clearly dependent on them in that they are rooted in historical and philosophical questions about "the human," which are rooted in historical and philosophical questions

about race. It is important to point out, though, that Western technology has always been haunted by the parallels that Levy so easily depends on, particularly between machines and slaves. It is a product of a drive to embodiment that is older even than modernity, but which came to cultural material fruition in the context of industrialism and chattel slavery. That very drive to manufacturing a future, one that depends on bodies and labor while promising escape from bodies and labor, ensnares technology in the problems of our past, and is why metaphors of race, sex, and *reproduction* entangle us in the material problems of imagining and inventing a future.

These days, however, the anxieties and arguments are primarily focused on algorithms, machine learning, neural networks, and their increasingly intimate social presence and cultural power. Though less focused on the anthropomorphism of previous technological anxieties, our moment has turned exactly to the sphere of ethics to engage or correct this legacy of human and machine. Problems, for example, now regularly appear in seemingly unpredictable spaces of pure invention—so-called misogynistic chat-bots in the virtual spaces of sociality, racist facial recognition systems, prejudiced algorithms in neural networks, the call for robot rights in advance of full automation, the specter of an AI that is human enough to be described as prejudiced.

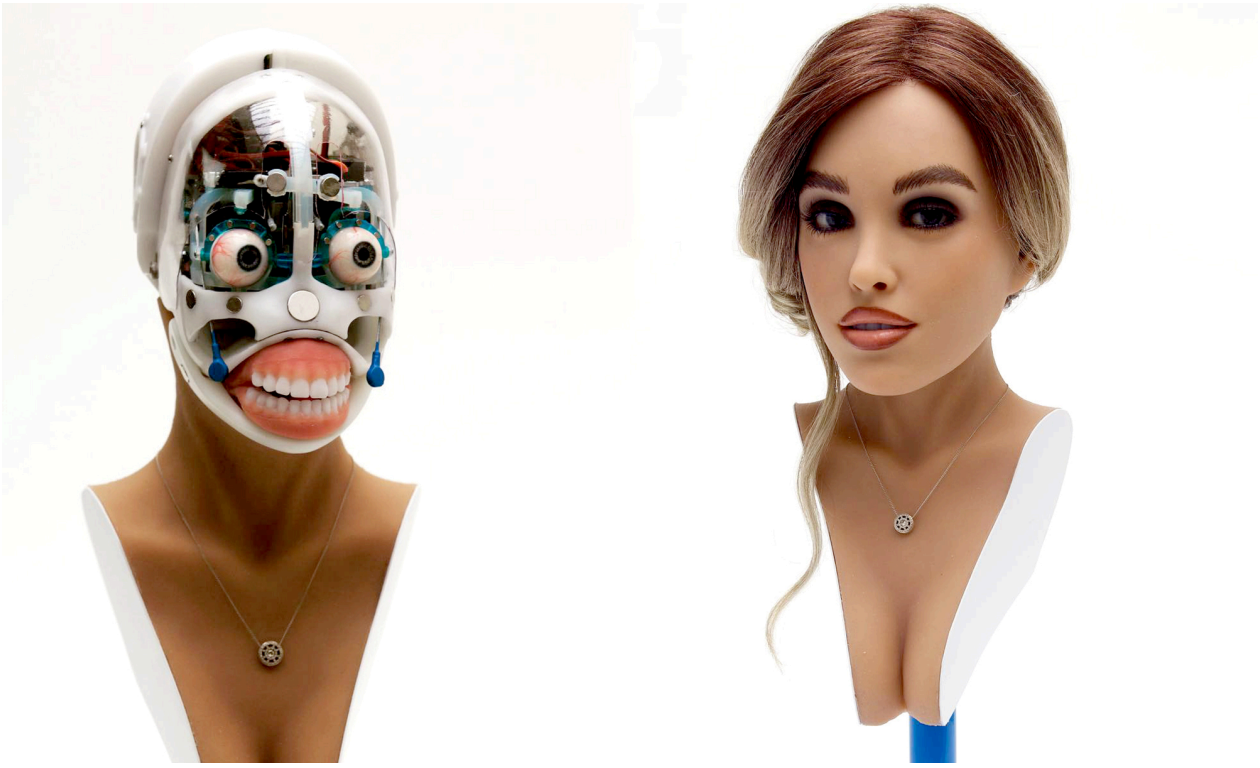
And if this all seems still somewhat too abstract, there are the complex problems of gender, sex, and power at work in the emergent field and market of sex/companion robots, which will no doubt force a larger cultural reckoning with all these socio-political issues, particularly in the sphere of intimacy and, yes, sex and marriage. Suddenly, fields neither known or celebrated for their attention to race, sex, prejudice, or cultural sensitivity, such as computer science or robotics, find themselves ill-equipped to answer questions that have provided the subtext of much Science Fiction but which can best be identified when refracted through the lens of black and post-colonial thought, and feminism. Questions like, how do we in fact create synthetic bodies without the histories and habits of how we have previously treated, known, and organized different bodies? How do we apprehend a synthetic mind without tripping over the legacies of differential apprehension and the apprehension of differences? And what are the roles of race, gender, and desire in rendering object as subject, thing as being? We have been here before.

Personhood and Machine Autonomy

Machine learning, we know, often keys in on subtle excesses in our language and our patterns of representation, particularly those we are unaware of or silently acknowledge are inappropriate. In other words, machines make sense of our hesitations, know our secrets. We have long known that racism is often a change in breath, a type of hesitation, a sometimes barely recognizable response to certain bodies or unpredictable desires. This is how technology learns what we refuse to acknowledge about our past. What greater evidence of prejudice can there be than in finding it re-produced and amplified by a mirroring not of our naked prejudices but of our silences and denials, the imperceptible rustling of skin and breath? Until we find a way to program guilt into our technological systems as a way of monitoring or self-policing their responses, they will continue to be far more honest than we are about such information.

Lest we imagine these questions as purely abstract and in the private realms of individual ethics or paraphilia, corporate titans like Microsoft, Amazon, and Google, who now houses DeepMind Ethics and Society, and powerful groups like the Institute of Electrical and Electronics Engineers (IEEE), have begun to formally wed their interest in advancing technology to anticipatory or pre-emptive ethical standards. This is a response to those so-called "algorithms of oppression" or "weapons of math destruction" that suggest how surprisingly pliant our technologies are to human foibles.[5] And just as machines and algorithms begin to display a likeness to humans via their tendency to discriminate, the European Parliament has even begun considering distinct regulations to govern them. Curiously, the regulation being considered is not focused on transforming design or programming parameters with an awareness of bias or a commitment to rooting out prejudice, or transforming the cultures of tech; instead the goal is to grant these technologies a distinct form of "electronic personhood" in lieu of full humanity. England's Prime Minister, Theresa May, has for example declared that the UK should be the world leader in determining the ethics of Artificial Intelligence.

One wonders what this sort of "personhood" means since its focus is on liability and the reality of biases in algorithmic decision-making. Just who is responsible when an electronic person is judged to be racist or sexist or to have operated in discriminatory ways? And does not ethics imply some degree of reciprocity, or mutual recognition?



Sex dolls produced by the company RealDoll (California, USA), 2019

One cannot help but wonder if this personhood is less about ethics than it is a moral capitulation. Instead of addressing the socio-political and historical conditions of bias, it shifts the terms of debate in ways reminiscent of that old British imperialism which in the 19th century ended slavery primarily to use *the ethical* as a way to politically challenge the rising threat of America in the Atlantic region. The point was not to end racism but to use it to decry a political adversary. For example, Europe's interest in morally regulating AI seems merely in anticipation of China's stated determination to be the global leader in AI technology. We can see the old back and forth between types of imperialisms here—the one unabashedly technological, driven by profit motives and without any political restrictions, and the latter, in denial of its racial history and able to curb the former only via a new form of that soft, human rights imperialism that China has long accused the West of using to stunt Chinese industrial growth and globalization. This global struggle over the ethics of machine intelligence should remind us that our futures with machines lie in personhood and its inevitable variants—not with clichés of an alleged "humanity" being usurped or romantic notions of its fundamentally untranslatable (or un-commodifiable) nature, or the kind of anxieties that dominated 20th-century culture and science fiction, those generated by anthropomorphism. The fact that "humanity" has been violently withheld from certain "genres" of humans, as

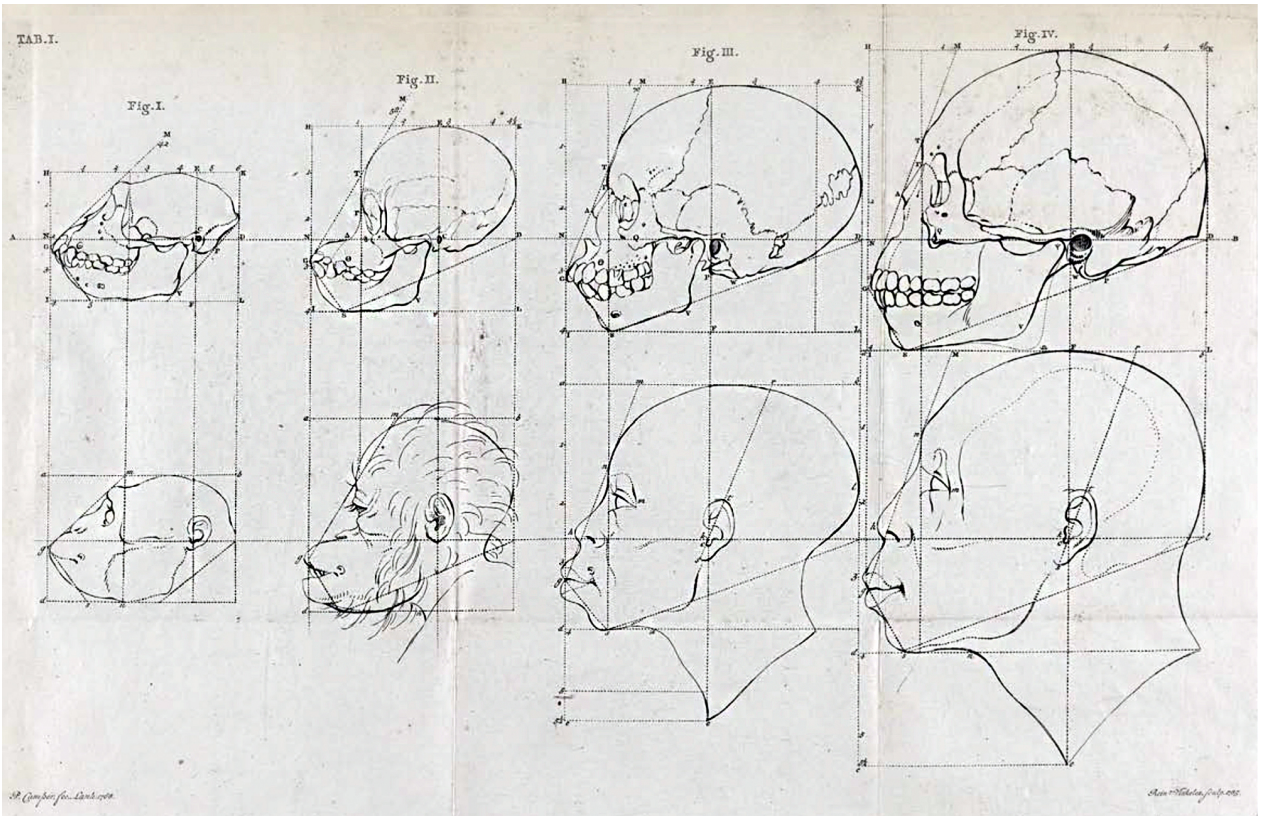
Jamaican theorist Sylvia Wynter would put it, and that metaphysical, cultural, and economic systems have been erected on that denial, means that the term is far less absolute than its mythology insists.[6] Personhood matters more because it has a much clearer history than "the human," certainly in sexual and racial terms, and as a category has been far more socially flexible and legally mutable. To know who or what can or will become admitted into personhood simply requires a history of the category.

Can Objects Comply?

It is worth pointing out that the kind of personhood being discussed above is anathema to the high capital dependent companies that produce robotics and AI. Who would want to produce a commodity that you could not sell for fear of being charged with some form of trafficking, or a machine you could not employ without common restrictions of labor, which is to say, rights? Even manufacturers of so-called "sex robots" or "companion robots"—and Levy himself—are having to deal with anticipatory ethical standards, as well as organized protest framed in explicitly ethical terms and always vis-à-vis "real" women. But these are the primary cultural tensions and implications of "personhood" for manufacturers of machine subjects, or of machines that resemble or function as subjects. After all, personhood was not only shaped within capitalist social relations but also specifically through chattel slavery. As a pliable and politically fraught category, it depends on animating the inanimate, or giving soul to the soulless. It features the bestowing of "life" or social recognition to objects, which then implies or threatens one with the possibility of intimacy—though it is more often the case that it is desire or intimacy that either breathes life into the inanimate or forces social recognition of the object. Here, one cannot help but reflect on critic/poet Fred Moten's now famous declaration that the "history of blackness is testament to the fact that objects can and do resist."[7] Can we now query whether it is also true that objects comply, or can consent? Take for example Levy's discussion of the case of Angela Marie Vogel, the activist whose marriage to a corporation (or "corporate person") was repealed in 2012 by the State of Washington.[8] Even here, race becomes central to framing the possibilities of personhood as well as its legacy. The state argued that though endowed with the rights of a "natural person," this "artificial person" could not marry because it was incapable of consent. Oddly enough, the lack of consent in this case had little to do with the fact that the "person" in question was artificial. The real problem was the age of the "groom": it/he/she was only a month and a half old, and the legal age of consent is eighteen. Statutory age notwithstanding, greater challenges will no doubt appear given the pliability of the

category of "artificial person" and its validity as a legal strategy. Even though Vogel was making a legal point, challenges may arise from what is called "Objectum Sexuality" and related "objectophile" paraphilias, in which humans fall in love and/or form intimate, sexual, and meaningful relationships with objects and in some well-known cases, cars, bridges, and buildings (the Eiffel Tower, for example). They are most certainly emerging due to the growing market for "sex dolls" or "companion robots" and may yet put pressure on the legal system to recognize these relationships, provided of course that the "artificial persons" reach the legal age of consent.

Were Levy to dig a little deeper into American history and the history of chattel slavery, it would be clear that "Objectum Sexuality" and interracial marriage are not actually the primary precedents for human/robot love, nor are they the primary legal justification for the merging of flesh and fabrication. Both depend on something much more foundational and that historicizes interracial merging and paves the way for the inevitability of other such border crossings, that is, "corporate personhood." As anti-corporate activist and writer William P. Meyers has famously written, "Slavery is the legal fiction that a person is property. Corporate personhood is the legal fiction that property is a person."[9] Both legal fictions emerge from the same place: the 14th Amendment.



Petrus Camper, Transition of the facial angle, from the monkey to Apollo, in *Dissertation on the natural varieties that characterize the physiognomy* (Paris: H. Jansen, 1791). Engraving.

Recall that the 13th Amendment abolished slavery in the United States. The 14th, adopted in 1868, was established to affirm equal protection under US laws for blacks as well as to grant citizenship rights to former slaves in the wake of the Civil War. It erased the notorious "Dred Scott" decision from 1857 which held that those descended from African slaves were ineligible for American citizenship, and paved the way for the 15th Amendment in 1870, which gave black males the right to vote. Due to an awareness of the still strong notion that blacks were not quite or fully human, as well as a great many social and cultural forces attempting to maintain some sort of racial hierarchy—including an enormous upsurge in racial violence—in the wake of the Reconstruction era, the Supreme Court made clear that the 13th–15th Amendments were specifically for "the freedom of the African race, the security and perpetuation of that freedom and their protection from the oppression of the white men who had formerly held them in slavery."

Yet despite this codicil, the Court was unable to avoid the surprising elasticizing of personhood embarked upon by the Southern Pacific Railroad in 1881. The Railroad argued that special taxes on railroad property in California discriminated against it specifically under the 14th Amendment. Apparently, the law's protection of racial identity could be manipulated to address corporate identity, since the very definition of "person" could now be challenged. In 1882 the railroad deceptively yet successfully argued that the drafters of the 14th had replaced "citizens" with "persons" in order to account for "artificial persons" as well as "natural persons."

That personhood was or could be a state construct was clearly a product of chattel slavery, and the 14th Amendment attempted to rectify that primal dehumanization of Africans. In the context of law, however, it rendered "personhood" far more fluid than nature or history had previously allowed. This redefinition of personhood would benefit corporations far more than those it initially intended, because by 1896 the Court legalized segregation via Jim Crow laws with the notorious Plessy vs. Ferguson/separate but equal doctrine whilst corporate culture would only expand its influence via that same legal logic of "artificial personhood."

New Species, Old Prejudices

And so, we end at the beginning. In historicizing the relationship between ethics and technology, humans and machines, we wind up at that precise historical moment where the first singularity was ratified. Here, personhood was first deployed to rectify a historical ill (dehumanization) by way of legally constructing a new kind of human being. It then revealed the category as fluid, thus opening the gates to expanding personhood in inorganic, "artificial" terms, something clearly crucial in the movement towards a recognizable if not fully autonomous AI. But given the long historical imbrication of race and technology and the inescapability of one history and sphere of meaning from the other, we also end at the future, the precise location where that next singularity is already being naturalized and may one day be justified.

Paul Richer, *Male Model, Venance*, in «Carnet de fiches anthropométriques», 1923-1939. Paris, ENSBA

So, what now?

Well, for one thing, the impact of racial, sexual, and cultural differences must be taken seriously as we acknowledge the near-inevitability of artificial beings and some forms of Artificial Intelligence. From this position between singularities, it should be clear that our social acceptance and cultural tolerance for such beings will likely have little to do with how "human" they seem or how like us they may be. What will matter far more is how we make sense of them via histories of otherness, from subservience and domination to anxiety and pleasure. As suggested by Despina Kakoudaki, we might finally be ready to push beyond the aesthetic and cultural limits marked by the Freudian uncanny because "verisimilitude" is beside the point.[10] For example, we have learned that robots that look too much like human beings can trigger a hostile and suspicious response, but those that are deliberately modeled to look like characters or exaggerations, or vividly inhuman, can actually generate great empathy, warmth, and affection. We also know that feigned affections can generate authentic attachments. Therefore, so can programmed ones, especially if we are exposed to them as children, which is the point of the "sociable" or "domestic" robots produced for use with children or the elderly.

Again, what will matter more is not what machines look like but how we interact with them despite visual or epidermal differences, or despite even glitches that will inevitably be read as either signs of personality or the equivalent of cultural variations. Of course, when it comes to algorithms or an utterly de-anthropomorphized or non-representational computer landscape, none of this will matter at all. But

socialization, power, and intimacy will still occur despite the fact that the true agency that we ascribe to cognition and "free will" may either never actually be constructed or capably recognized. "Free will" or autonomy will have nothing to do with our social, political, or sexual recognition of machines considering how historically contingent such things have been with regard to, say, blacks—who without them still functioned in the most intimate spaces of white life during slavery. And in the wake of legal personhood, blacks have had their "humanity" relentlessly questioned because in truth, that personhood was meant to maintain a distinction from a full humanity considered to be the sole property of whites.

Ultimately, the social recognition of robots or AI will have everything to do with how they function in relation to humans, as well as how they are governed by a set of common and reciprocal values generated to contain the raw fear of otherness while policing the terms by which intimacy is possible—providing, of course, that machines are capable of honoring those values and their capacity for reciprocity is acknowledged. Either way, race will continue to be decisive in the cultural and legal process of making machines persons, if not human, because the quest for an ethics of machine/human relationships and the drive to inculcate or program an ethical matrix into technology is dependent on the history here discussed. Not only does this history guide our metaphors, and haunt rules of representation, it should continue to. This is because it conditions how we can even conceive of relationships founded on differences so radical that they were historically imagined and legislated as differential between species, or between humans and objects.

Because it is the historical sublimation of slavery, immigration, and their attendant anxieties that ultimately accounts for the contemporary attempt to create an ethics in public relationships with AI, it should also be the case that an honest reckoning with the last singularity and its legacy will generate the terms by which such beings will be engaged. This is the case from miscegenation to cybernetics, and from immigration to assimilation and Civil Rights. Science Fiction, in fact, tells us that it is the very refusal to change our historical relations with "the other" that often inspires those hackneyed but enduring "revolt of the robots"/rise of the machines narratives in the first place. So, given the nature and long impact of that last singularity and the fact that its echoic traumas forever color conceptions of life itself, machine intelligence and artificial life will explicitly depend on extant histories of cultural otherness—at least in terms of personhood, but at most in terms of citizenship and its relentlessly reciprocal demands.

Footnotes

1. David Levy. *Love and Sex with Robots: The Evolution of Human-Robot Relationships.* Harper Perennial, 2007, p. 303.

2. Kodwo Eshun, "Further Considerations on Afrofuturism." *CR: The New Centennial Review*, 3 no. 2, Summer 2003, p. 290.

3. See Samuel R. Delany. *Dhalgren*. Bantam Books, 1975.

4. David Levy. "Why Not Marry a Robot." Goldsmiths, University of London, UK, 2016. Lecture, https://www.youtube.com/watch?v=Tl-IdfzWBfo.

5. See *Safiya Umoja Noble. Algorithms of Oppression: How Search Engines Reinforce Racism*. New York University Press, 2018; Cathy O'Neill. *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. Broadway Books, 2017.

6. See Sylvia Wynter. "On How We Mistook the Map for the Territory, and Reimprisoned Ourselves in Our Unbearable Wrongness of Being, of Desêtre: Black Studies Toward the Human Project." *A Companion to African-American Studies*, edited by Jane Anna Gordon and Lewis. R. Gordon, Blackwell, 2006, pp. 107–118.

7. Fred Moten. *In the Break: The Aesthetics of the Black Radical Tradition*. University of Minnesota Press, 2003, p. 1.

8. See Jake Ellison, Evan Hoover, and Mallory Kannis. "Why King County Nixed Woman's Marriage to a Corporation in Seattle." *KNKX*, July 2012, https://www.knkx.org/post/why-king-county-nixed-woman-s-marriage-corporation-seattle.

9. Quoted by Dean Ritz. "Can Corporate Personhood Be Responsible?" *The Debate over Corporate Social Responsibility,* edited by Steven K. May, George Cheney, and Juliet Roper, Oxford University Press, 2007, p. 193.

10. See Despina Kakoudaki. *Anatomy of a Robot: Literature, Cinema, and the Cultural Work of Artificial People*. Rutgers University Press, 2014.

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Love in the Age of Algorithms

Anna Longo

Once, the purpose of knowledge was to give form to reality; then its aim became the production of possibilities; now it has become nothing but a risk manager. Once, we were producers; then we became consumers; now we are products. Once, the body's strength was exploited to produce goods; then the energy of desire was exploited to consume goods; now one's creativity is exploited to produce the self as a commodity. Once, we had children; then we desired children; now we have become children. Once, love was a pact of mutual support; then it was a desire; now it is the price at which we sell ourselves. Once, machines were a means to our ends; then they were the ends for which we were the means; now they are oracles that interpret signs and whose prophecies we interpret. Once, we were in a disciplinary society; then we were in a society of control; now we are in a risk society.[1]

Risk Control

Michel Foucault maintained that the analysis of discourses on sexuality could help us understand the structures informing historical societies. He observed that "the sexual conduct of the population was taken as both an object of analysis and a target of intervention"[2] from a perspective "at the boundary line of the biological and economic domains."[3] In this way, discourses on sexuality, love, and the life of the couple could disclose the evolution of the mechanisms by which social order was guaranteed. Foucault noted that a new mechanism was in the process of taking hold at the time of his writing (after the May '68 movements), which, instead of focusing on relationships (the family,

for example), took bodies and desires as its object. Medicine and psychoanalysis provided knowledge on sexuality that was functional for the exercise of biopower. In Foucault's words, "We … are in a society of 'sex,' or rather a society 'with a sexuality': the mechanisms of power are addressed to the body, to life, to what causes it to proliferate, to what reinforces the species, its stamina, its ability to dominate, or its capacity for being used."[4] We were thus urged to confess our practices and desires not only to doctors and psychoanalysts, but also publicly; and what could appear as an act of liberation[5] was in reality the mere effect of a mechanism of knowledge and control aimed at regulating and directing sexuality. According to Foucault's analyses, society was administered not so much by repression and inhibition as by a manipulation of desire that had us believing in its liberation—all of which served to produce consumers who invested for their own pleasure in a system ready to provide them the wherewithal for satisfaction in participating in the effectiveness of the mechanism.

Building on Michel Foucault's analyses, Gilles Deleuze announced in the 1990s "the progressive and dispersed installation of a new system of domination,"[6] and claimed that "societies of control … are in the process of replacing the disciplinary societies."[7] This control, he argued, is exercised by "machines of a third type, computers."[8] In fact:

> *If motorized machines constituted the second age of the technical machine, cybernetic and informational machines form a third age that reconstructs a generalized regime of subjection: recurrent and reversible 'humans-machines systems' replace the old nonrecurrent and nonreversible relations of subjection between the two elements."*[9]

Deleuze had already noted this transformation in the 1970s, when he and Félix Guattari wrote *Anti-Oedipus*, where they announced that, given that deterritorialization is rapidly being carried beyond any limit, "[W]e really haven't seen anything yet!"[10]

Indeed, at the time, fourth-generation machines and their learning algorithms had not yet invaded daily life; we had not yet seen the 2008 economic crisis, fiscal austerity measures, finance automation, and high-frequency trading; neither had we experienced the explosion of social networks and the proliferation of start-ups. In short, we had not yet seen all what has precipitated, it seems to me, the progressive installation of a new system characterized no longer by the cybernetic control of flows of desire fostering consumption, but rather by the calculation of a range of risks to incur in order to achieve one's goals. We are in the process of moving from a biopolitical society of control, where the goal was protecting and modulating the life of consumers, to a risk society.[11] Risk here is to be understood in the sense in which it is used in games of chance where the goal is to decide how much to invest in oneself today in order to sell oneself at the best

price tomorrow, all the while knowing that nothing is more volatile than value and that knowledge only expresses this degree of uncertainty with regard to the future, or, more precisely, to all calculable futures.[12] It is through an analysis of the way romantic, intimate, and sexual relationships are constructed today on dating sites and social networks that I will attempt to show, in what follows, how we have progressively moved from control to risk.

Matching Algorithms and Dating Sites

The first algorithm for matching couples based on affinity calculations was created in 1965, before the introduction of the Internet, by Jeff Tarr, then a student at Harvard University.[13] The use of computers to calculate romantic compatibility is an old process, and the systems we have today are the result of numerous efforts, studies, and experiments. Algorithms for creating romantic couples, such as the algorithm for the

so-called “stable marriage,”[14] provide solutions for other problems as well, such as, matching organ donors and patients, or determining the assignment of students in schools.

The introduction and spread of the Internet in the 1990s were crucial to the development of the many online dating sites that have since proliferated in countries around the world[15]—yet the beginnings were not plain sailing. For one thing, people found it hard to entrust the search for something as unique as love to a mathematical calculation, and, for another, these sites were seen as a last resort for the most desperate cases. This unfavorable opinion began shifting in the 2000s.[16] There were many reasons for this change in attitude, related chiefly to the popularization of the Internet and the expansion of its use for finding answers to all kinds of questions, but also for communication, self-expression, and dialog.

Obviously, love is an unpredictable feeling that cannot be calculated, but it is also evident that we each tend to appreciate, in the other, certain qualities more than others and that recurrent patterns are found in happy couples. So why not let algorithms propose an initial selection of profiles that correspond to our criteria and put us in touch with people we would not have the opportunity of meeting in the closed circle of our daily interactions. This is what Match.com, the first online site of its kind, set out to do when first launched in 1995. It worked quite simply at first: users created their own profiles (usually using a pseudonym) based on a limited number of characteristics; the algorithm then presented the user with a classification of more or less compatible people, and the user could then send messages to these potential matches to start getting better acquainted. The site worked by delivering a selection of new compatible profiles every day, which served both to increase the chances of individuals meeting their mate and to make the choice more difficult, with the effect of keeping subscriptions going longer.

In 2008, in response to the emergence of tough competition, Match.com developers reviewed data from more than a decade of interactions on the site. They observed that users often broke their own rules, choosing potential matches that did not entirely correspond to the preferences stated when they created their profile. Consequently, they decided they would need an algorithm that could incorporate additional information into the equation for sorting potential matches. The new system that was devised proposed not only the most compatible partners based on a user’s stated preferences, but also those receiving messages from users with a number of common preferences. By this triangulation, the algorithm became capable of surprising, exactly as in life, and of figuring out what we like faster than we can. Similarly, the OkCupid.com algorithm,

acting as an oracle, began emphasizing the importance of knowing oneself before all else and offering new users guidance in discovering who they are and conveying it effectively. For this purpose, part of the site is dedicated to advice on creating a competitive profile,[17] and a blog[18] features statistics on dates and paired-off daters.
Confessing, directly and indirectly, one's preferences, desires, sexual orientation, techniques of seduction, behaviors, and vices, is surely promoted, as Foucault suggests, for the sake of producing knowledge and, moreover, for commercial purposes (the data is used to sell advertising spots). However, it seems to me that something else is going on. Keep in mind that the data is published on a blog accessible to users of the site. This means that the same information exploited by businesses to develop their advertising strategies is available to individuals for their personal promotion. Users are thus urged to adopt a precise strategy and invest in creating a profile and in the activity on the site, not in order "to blend in" but, on the contrary, "to stand out" from the crowd and to reap the benefits of this exceptionality. In this sense, the process increasingly resembles decision-making in games of chance, that is, how much to put into the pot today—in terms of information retrieval, product development, and communication—in order to maximize profits in the future, which, at any rate, is not guaranteed.

We are urged to express ourselves, to be ourselves, that is to say, to display our singular patterns which, on the one hand, make us stand out from the crowd and, on the other, increase the degree of uncertainty since they constitute new information in relation to which other users must rethink their strategy of imitation or differentiation. The

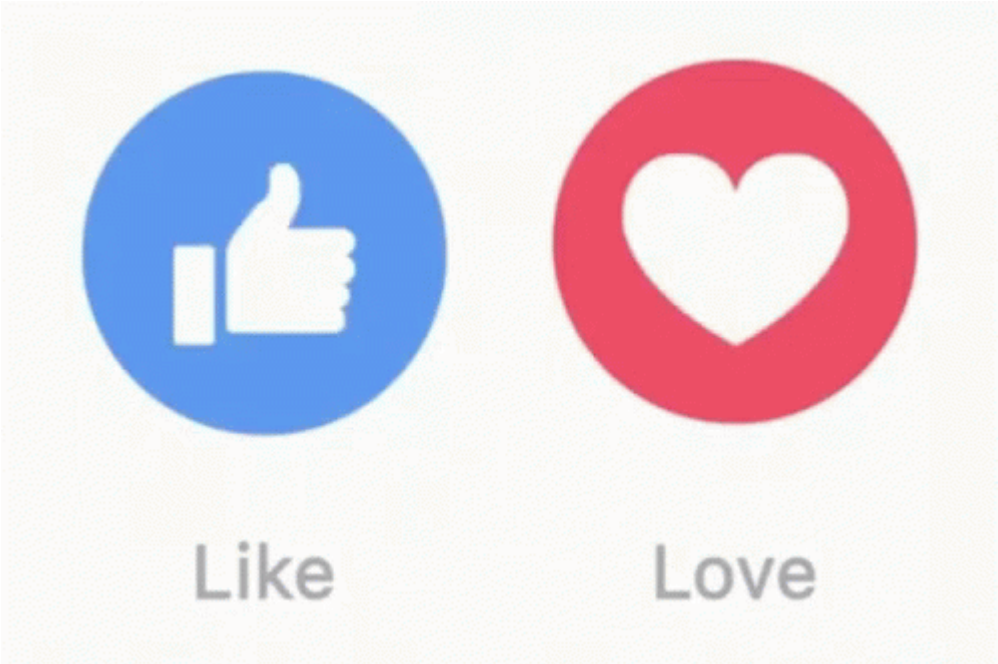
diversification of dating site markets and the appearance, around 2011, of niche dating services is to be understood in this light.[19] Niche sites are dedicated to minority communities whose members feel disadvantaged or even discriminated against on general sites for reasons of origin, religion, sexual orientation, age, interests, tastes, and fantasies, etc. Choosing a niche is a specific strategy that involves bringing the competition into a field, or network, in which we think we have a better chance of achieving our goals.

Social Networks and Apps

Although this was not its primary purpose, Facebook has become the most popular dating site today, as many use it for flirting.[20] The development of social networks had the effect of reducing traffic on dating sites from 2010 on. Unlike on dedicated dating sites, Facebook users do not have pseudonyms and content is produced and shared spontaneously without the need for a questionnaire. Social media are not aimed at putting people in touch based on romantic compatibilities, but the algorithms they use to reward users for producing the most interesting content (according to the individual user's respective commitments) can prove very effective in this domain. Facebook, for example, applies a version of the Vickrey-Clarke-Groves (VCG) algorithm devised for auctions. Users propose their offer, which is validated by not only by "likes" but by time spent reading a user's post or page. The fact that Facebook's algorithm is a version of algorithms used for auctions, as are those used by other social networks, makes it clear that the point is not simply to match users and contents, but rather to stimulate the production of game strategies in order to receive, as a reward, the dissemination of one's content and access to one's favorites. It is not a coincidence that social networks are increasingly being used for commercial purposes and that there are more and more guides for developing social media advertising strategies.

On social networks, it could be said that the matching system has expanded to include all aspects of life and is no longer limited to romance. All relationships are increasingly mediated by algorithms which, on the one hand, learn from our preferences, tastes, and interests, and, on the other, suggest how to satisfy them knowing that satisfaction depends first and foremost on the quantity and quality of the information we share. In this way, strategies for finding love are not so different from those for finding good professional opportunities. The difference between life online and offline tends to fade as a result of miniaturized technological devices such as smartphones. Mobile apps, such as Tinder and Badoo, make it possible to integrate the search for love into daily activities,

many of which also rely on the help of technology. One might suppose this implies a trivialization of the search for love, which would be divested of its "authenticity," since it is put on the same level as other types of online searches. But the opposite is also true: all our daily activities, mediated by algorithms, increasingly resemble the search for love. Not only do these online services offer us personalized choices that depend, directly or indirectly, on stated preferences, but we are also invited to give our opinion and evaluate all transactions, interactions, and experiences as if, each time, it were a matter of finding the person we deserve. Algorithms learn to know our desires, our preferences, and our interests and try to figure out what we like even before we know it ourselves. Hence, we must admit that algorithms love us, and not only for what we are, but also for what we could become thanks to them.



How do algorithms love us? Firstly, they do not love us in any exclusive way: they love everyone and do so according to the degree of commitment we demonstrate. Although anyone can, a priori, find favor with them, to earn their attention we must know how to be deserving. We are all competing in a universal game that involves knowing how to forge alliances (social networks) and devise strategies to earn points and a good position in the ranking. We are constantly being informed of the moves being played by others (what they like) and their ranking (how much they are liked), without however being given the means to understand exactly what their strategy is and what it will achieve. Is it a winning strategy? Should it be imitated? Should we join in? How much should we offer? How much should we bid? In short, do I "like"? The algorithm constantly updates the

ranking and lets us modify our expectations, assumptions, and strategies. We must constantly evaluate our chances of winning over the chances and desires of others. Furthermore, we must constantly reevaluate the margin of error of our predictions and the risk carried by any strategy, especially since we are acting in the absence of sufficient information, that is to say, on the basis of constantly changing information. Algorithms favor those who have the courage to expose themselves, who find ways to stand out, to surprise by being receptive to new competitions, and to those who produce new information, thereby compelling everyone to adjust their bid. If nothing is ever won forever, neither is anything definitively lost; when it comes to love, as everyone knows, nothing is to be taken for granted. What counts is not the definitive victory, but rather the fact of being able to continue to play, the fact of being able to not know what will happen tomorrow while still being able to hope that tomorrow will be happier than today. But, do we really like this game?

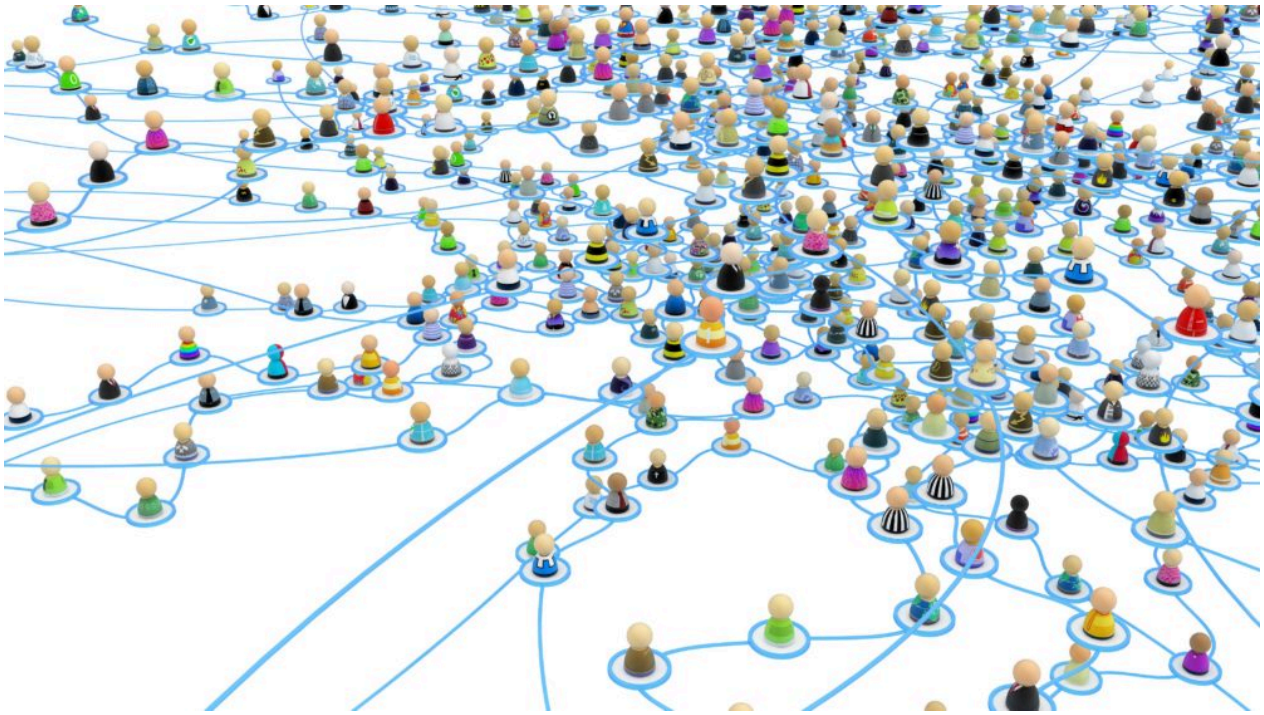
Towards a Risk Society

The term "risk society" was introduced by Ulrich Beck[21] to name the contemporary phase of modernity, in contradistinction to the "society of control."[22] In agreement with Anthony Giddens' analyses,[23] Beck maintains that the reflexive attitude that characterizes our lives throws us into a situation of uncertainty concerning, on the one hand, the effort to determine the risk involved in our social activities and, on the other, the impossibility of knowing with any certainty the effects of technological transformations and actions. Traditional modernity, and its production-based economy, feared exogenous threats that could affect resources, damage the means of production, and reduce the productivity of workers and the capacity of consumers to spend. The probability of these risks could be calculated,[24] and control of the social machine was aimed at averting them by way of exclusion and normalization. In contrast, in the second phase of modernity, the threats have become internal, determined by the very effects of the activity of production. The latter exposes us to new manufactured risks such as global warming due to pollution, more cancers caused by the use of chemicals, disasters connected with nuclear power, and worldwide economic crises brought on by speculation in finance. Uncertainty depends on the fact that only concurrent hypotheses are available to us about the probability of these risks and the potential success of the strategies to protect us from them. Furthermore, since the risk is initially dependent on the activity of knowledge and the technological applications thereof, operations aimed at reducing the probability of a future catastrophic event could generate a different one

that we would not be able to predict. According to Beck, the risk society is defined by this dynamic of continually updating potential risks that depend on the evolution of the conditions that carry these very risks, meaning the development of knowledge, which is not subject to scientific prediction. For this reason, reflexive modernity cannot endeavor to impose a normalizing control; this attitude is potentially dangerous and exposes to the risks evidenced by critics of authoritarian modernity, such as Foucault.[25] All it can do is recompense creative behaviors in order to limit the risks carried by the unpredictable evolution of knowledge. Consequently, all decisions are made in a regime of uncertainty, since we have to choose based on often discordant prognoses regarding the always new and endogenous future catastrophic scenarios we are trying to avert. This uncertainty depends at once on the ongoing evolution of conditions, that is the largely unpredictable future of the environment, and on the fact that every prediction can only be made on the basis of imperfect information. In this way, the risk society is thought to have replaced the society of control: the uncertainty is such that no control is possible and all efforts at gaining more control merely augment the risk.

To return to our matching algorithms, one could say that they function in accordance with this perspective since the information and data collected on an ongoing basis are used neither to determine behavioral deviations from an established norm for the purposes of imposing the latter (as in the society of control), nor to create a stable portrait of this or that user, but rather to produce probabilistic predictions as to the possible evolution of behaviors.[26] From this point of view, priority is given to information that is useful for understanding how the current dynamic could be modified or for evaluating the risks carried by future states of the environment (or of the network) based on unpredictable changes in existing conditions, that is to say, in available information. To what risk do we expose ourselves by betting on one scenario rather than another? What risk is involved in a profit strategy that relies on the actualization of a future event of which we have no experience?

Algorithms, as we have seen, work to identify patterns of behavior rather than to define what one person or another likes or dislikes, does or thinks, and to understand what actions and decisions this entails. Knowing who does what and with whom (so as to prevent deviant or unproductive behavior) is not what matters; what is important is that the algorithm, once a pattern of hypothetical correlations is detected, can launch a functional signal to action: propose a given product, or send a police patrol or an alert to find shelter in an underground bunker. For this reason, all behavior outside the supposed norm is precious because it makes it possible to update forecasts and to introduce new ones that can be exploited thereafter. Thus, it seems to me that the real question is always: what strategy can we adopt to make the most of this information, knowing that it is only 80% reliable and that this behavior carries risk X?



What interests me to not here is that we look at possible futures the same way that algorithms calculate them. According to Michel Callon[27] (among others),[28] the calculation of possible future states of the network/environment are performed continually by agents who themselves constitute this global hybrid system. These predictions are made from information available to agents according to their individual connections (the information is therefore always imperfect and dependent on one's position in the network), which reflects one's ability to collect new information in order to predict the future evolution of network configurations. Thus, not only do algorithms attempt to detect the behavioral patterns of human users, but humans, through developments in computational technology, are continually gathering information about the prediction strategies of algorithms in order to produce more powerful ones and more effective strategies than their opponents. This causes a change in conditions and forces everyone to adjust their behavior, modify beliefs and expectations, and expose themselves to different risks. How much should we bet on the probability of a future event that constitutes a possibility that has never been detected by any theory? What profit can be drawn from engaging with this risk?

In conclusion, I would like to note, without delving into the matter further here, that this type of computational reasoning is precisely what characterizes speculation in finance. Contemporary finance—introduced in the 1970s by computable formulas like the Black-Scholes formula[29]—is based on the sale of insurance against manufactured risks, that is to say the risk created by speculative transactions themselves.[30] So it is a matter,

on the one hand, of developing algorithms to detect the behavioral patterns of market agents in order to predict their effects on price variations and, on the other hand, of selling this information concerning arbitrage opportunities where the risk appears to have been correctly estimated and insured. However, this produces new behavior that changes the game, reintroducing uncertainty and, with it, the possibility of subsequent wagers, opportunities for profit and for ruin. The latter concerns especially those who did not engage enough with the algorithms, who have not taken care to surround themselves with efficient connections, who have calculated on the basis of restricted and obsolete information. No point then in looking for justice: what counts is love, and when it comes to the love of algorithms, we must be deserving, just as they deserve to be fed and cared for.

This planetary and hybrid network, where we are all calculating and clashing by exploiting alliances of information (of which we must be deserving) is a global casino where the one and only computational reasoning develops and realizes itself, like the

Hegelian spirit, in the coming to be of its states, through the development of contradictory strategies and hypotheses. However, this unpredictable becoming leads not to pure knowledge but to the endless reproduction of uncertainty and risks, to selling and buying: we trade in ignorance whose infinite becoming is the real stake. Possible futures are only offers of bets and manufactured risks between which we must choose, and innovation serves only to inject the needed measure of change so that nobody can be sure of winning every time, as this would lead to the bankruptcy of the global casino. The question, in this sense, is the following: do we really like this game, or have we just become collectively addicted?

Translated from French by Gila Walker.

Footnotes

1. See in particular Ulrich Beck. *Risk Society: Towards a New Modernity.* Sage, 1992. I will return to the question of risk below, reinterpreting it after an analysis of the functioning of matching algorithms.

2. Michel Foucault. *History of Sexuality, Volume I: An Introduction.* Translated by Robert Hurley, Random House, 1978, p. 26.

3. Foucault.

4. Foucault, p. 147.

5. "The irony of this deployment is in having us believe that our 'liberation' is in the balance." Foucault, p. 159.

6. Gilles Deleuze, "Postscript on the Societies of Control" (1990). Translated by Martin Joughin, *October,* Vol. 59 (1992): 3-7. An online version is available here. In his 1986 *Foucault* (University of Minnesota Press, 1988), Deleuze does not explicitly use the expression "society of control," but simply notes the shift from a more fluid and diffuse regime of power that takes control of life (biopolitics). The expression appears for the first time on the occasion of a talk he gave at Femis in 1987, translated into English as "What is the Creative Act?", and available online here.

7. Deleuze.

8. Deleuze.

9. Gilles Deleuze and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia.* Translated by Brian Massumi, University of Minnesota Press, 1987, p. 458.

10. "This tendency is being carried further and further, to the point that capitalism with all its flows may dispatch itself straight to the moon: we really haven't seen anything yet!" Deleuze and Guattari. *Anti-Oedipus. Capitalism and Schizophrenia.* Translated by Robert Hurley, Mark Seem, and Helen R. Lane, University of Minnesota Press, 1983, p. 34.

11. Unlike Beck, I intend to give the notion of risk a sense closer to the one found in game theory, notably in non-cooperative strategic games with imperfect information.

12. Computation is a specific type of calculation performed by computers following programs. Human beings have always calculated, but computation, linked to automatic performance, is a more recent method.

13. Dan Slater. “Love in the Technology Era”, Boston Globe Magazine, 13 January 2013. Available online here.

14. The “stable marriage” algorithm, created in 1962 by David Gale and Lloyd Shapley, is used by many hospitals and by the French national education system.

15. An exhaustive list can be found here.

16. See the 2016 survey by Pew Research Centre, available online here.

17. help.okcupid.com/

18. OkTrends.com was the blog on which Christian Rudder, one of the site’s founders, published statistics on the data collected.

19. Dan Slater. “Diaper Daddies and Lonely Stoners.” In *A Million First Dates.* Penguin, 2013, pp. 131–148.

20. In fact, the platform has launched an in-app dating service last month.

21. Beck, Op cit.

22. As Beck writes: “Many social theories (including those of Michel Foucault and those of the Frankfurt School of Max Horkheimer and Theodor Adorno) paint modem society as a technocratic prison of bureaucratic institutions and expert knowledge in which people are mere wheels in the giant machine of technocratic and bureaucratic rationality. The picture of modernity drawn by the theory of world risk society contrasts sharply with these images.” Ulrich Beck. “Risk Society Revisited: Theory, Politics and Research Programmes.” *The Risk Society and Beyond.* Edited by B. Adam, U. Beck, and J. Van Loon, Sage Publications, 2000, p. 222.

23. Anthony Giddens. *The Consequences of Modernity.* Polity, 1990.

24. According to the common definition, introduced by Frank Knight in *Risk, Uncertainty and Profit* (1921). New York: Signalman, 2009, risk is associated with the calculable probability of an event, even a random event (such as, the risk of betting on tails when flipping a coin), whereas uncertainty is the condition in which a decision cannot be made on the basis of a calculable probability (when you have to choose between alternative hypotheses concerning a particular random distribution, for instance, someone says that the coin is biased and someone else says it is not).

25. As Beck notes in “Risk Society Revisited,” p. 218: “World risk society theory does not plead for or encourage (as some assume) a return to a logic of control in an age of risk and manufactured uncertainties—that was the solution of the first and simple modernity. On the contrary, in the world risk society the logic of control is questioned fundamentally, not only from a sociological point of view but by ongoing modernization itself. Here is one of the reasons why risk societies can become self-critical societies.”

26. See the work of Louise Amoore on this subject, notably: *The Politics of Possibility: Risk and Security Beyond Probability.* Duke University Press. 2013.

27. See Michel Callon and Fabian Muniesa. “Economic Markets as Calculative Collective Devices.”

Organization Studies, 2005, 26 (8), pp. 1229–1250; and Michel Callon (ed.). *The Laws of the Market.* Wiley-Blackwell, 1998.

28. See Callon and Muniesa, pp. 1229–1250; and Callon (ed.).

29. The Black-Scholes formula is used to calculate the price of an option based on expected volatility of a subjacent asset.

30. On this subject see Donald MacKenzie. "The Big, Bad Wolf and the Rational Market: Portfolio Insurance, the 1987 Crash and the Performativity of Economics." *Economy and Society* 33:3, August 2004, pp. 303–334; and Elena Esposito. "The Structures of Uncertainty: Performativity and Unpredictability in Economic Operations." *Economy and Society,* 42:1, 2013, pp. 102–129.

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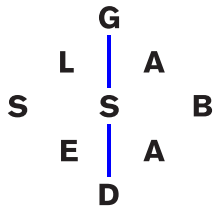

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Computing the Enigma of Love

Adam Berg

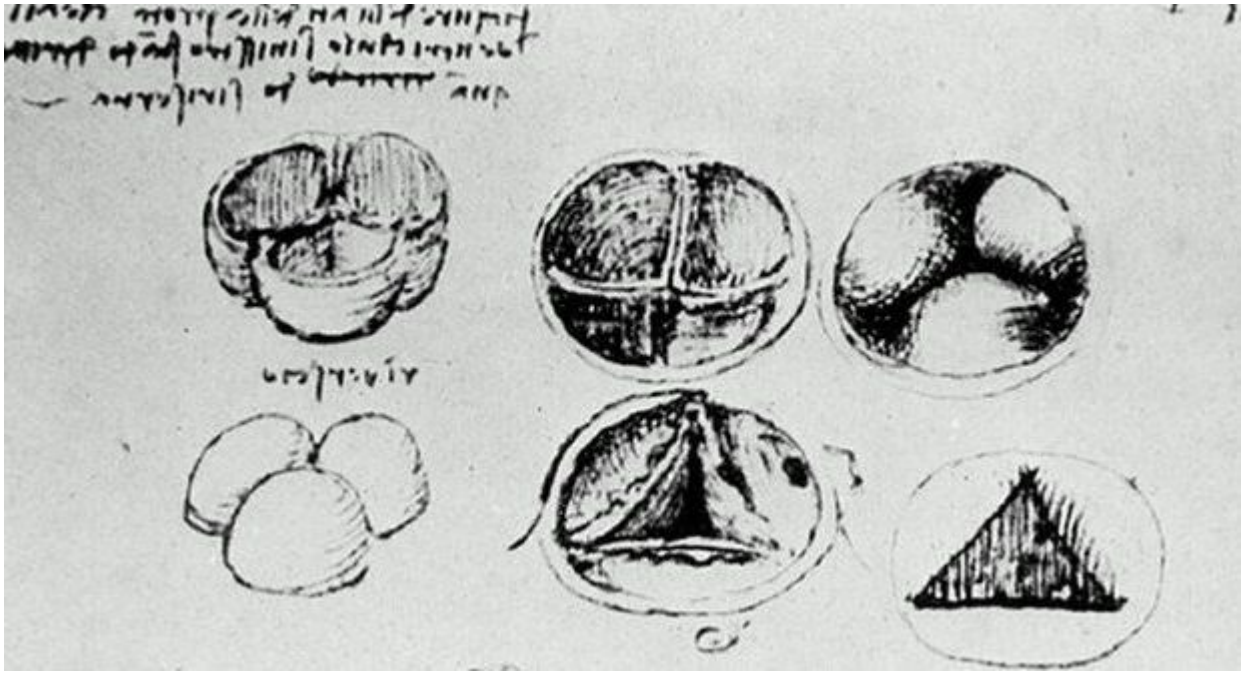
To be in love is to create a religion whose god is fallible.[1]
–André Maurois
If a machine is expected to be infallible, it cannot also be intelligent.[2]
–Alan Turing
Amore e 'l cor gentil sono una cosa
(*Love and a gentle heart are but one thing).*[3]
–Dante Alighieri

The history of the concept of love is linked to physicalistic descriptions of its chemistry and biology or to a transcendental plane of ideas thus leaving it cloaked in an enigma. My attempt here is to redescribe love's traditional enigma in terms of its 'black box,' namely, through examining the computability of love in reference to Alan Turing's work on intelligent machines and its analysis in an alternative way to the anthropocentric conception of love. I will discuss Turing and P-Type (pain and pleasure) and B-Type (brain) Machines; love, computability and free will; computation and concepts of the sublime in relation to love; and black boxism and computational transcendentalism.

Computers in Love: From the Chambers of the Heart to the P-Type Machine and B-Type Machine

Computing the enigma of love invokes Turing's own effort to crack the code of the German submarines in WWII, offering not only insight into the computational logic of the code but also a glimpse into the Lifeforms that established this bio-psychological stratum through computational algorithms, its compounded symbolic residue, so to speak.

For Dante Alighieri, love is instigated in a mechanical event which incidentally informs us that the 'brain' is the most animal-bestial of the bodily organs in the eventuality of 'love'; insofar as, for Dante, the *new life* is born out the recollection of brain-heart interactionism, it is memory as a category that makes love intelligible. Thus, the memory and recollection of his beloved Beatrice enables the computability of sensations, which turns sentience into a spiritual event. Alas, event implies solely the indispensable computability of Amor as it is transmitted as spirits.[4]



Heart valves drawing by Leonardo da Vinci, circa 1510. Collection Windsor Castle, United Kingdom.

Ramon Llull and his ars memoria as well as later Neo-Platonists theories of love tightly interlink love with memory and hence computability, since various types of memory are integrated within computational processes. For Turing, the P-Type (pain and pleasure) and B-Type (brain) Machines as well as the pain/pleasure input/output of an intelligent machine remarkably reassign Dante's mechanical qualities and Llull's ars combinatoria

mnemonics into a thinking-sensing-loving computer, one whose 'intelligence' is linked to fallibility and 'behavior' that entails the computer's 'state of mind' when erring and correcting its decisions (Alan Turing's Electronic Brain).[5]

Llull's mnemonic wheels are semantic (and numerical) acronyms, whereas Turing's are mechanical transcoding of algorithms (mathematical acronyms or symbolic abbreviations) into sensory and semantic plexuses.

The enigma of love can be decoded—following Turing—through a connectionist model between mechanical physicalistic conversions of algorithms back and forth from an agency in 'love'. And inasmuch as love had always emerged through the interaction of memory-physical mechanics—and computability—so it is that with Turing's computing 'love' we move from arcane forms of interactionism to novel possibilities of connectionism which nevertheless are all grounded in an epistemological embrace of physicalism.

The life of Alan Turing—the principle modern progenitor of the computer—was entangled with love (forbidden), enigma (breaking the enemy codes), and computation (Turing Universal Machine). Specifically, Turing's vision and work on computational machines as well as his insights regarding the mathematical basis of morphogenetic chemical foundations of life tell us a 'story' about a passion for the 'love' which makes us as agents the subjects of sentience and cognizance as well as empathy and intelligibility. Like Ludwig Wittgenstein, his colleague and friend, Turing strived to understand human behavior not by following the Aristotelian polarization of the lower bodily constituents (e.g., rocks, plants and animals) in relation to mentalistic dispositions. Rather, perhaps due to their shared background in engineering and mathematics, both related to mechanical configurations, mathematical rules and foundations as implying the inexhaustible formulations and functional computability of life, emergence, and behavior.

Turing's Pain and Pleasure Machine speculatively fuses computation with the pain/pleasure principle as a threshold to love (with or without sex) insofar as computers do not fall in love but rather are 'in love' with respect to a feedback 'looping' through which the object and subject of love are either changed or mirrored (negative and positive feedbacks) continuously within a neural network.

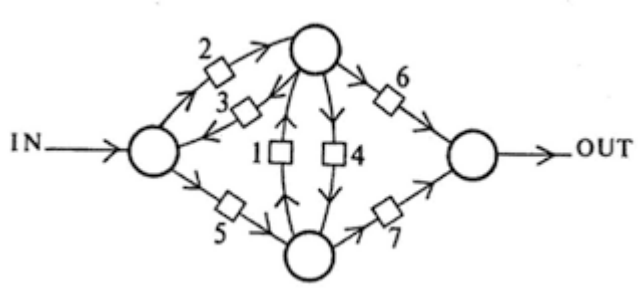
The binary coding of love posits its computation as either pain/pleasure oscillations or "love as experiencing of beauty" (Goethe) and love as an emotive manifold (Wittgenstein's *Lebensform*), as I will argue later, inasmuch allowing the rewiring and recoding of 'sex' through pain/pleasure sensorial interface, which strongly suggests a

transition from the Burkean concept of the sublime—and Sadomasochist Deleuzian and Guattarian concept of desiring machines and abstract machines—to an Intelligent fallible ("unorganized") machine.

Even a universal quantum computer or quantum Turing machine (QTM), based on Qubits and with a quantum algorithm, is fundamentally conceived within the framework of Turing's universal abstract machine.To some extent a Turing Qubit or quantum computer raises the possibility of superpositions which no longer (in a binary fashion) condition the love/sex opposition as that between desiring and abstract machines, but rather, of pain/pleasure as determinable both in terms of the level of energy or sensorial intensity determines whether an input is registered as pain or pleasure, and in as much it is identified as the semantic localization of the computational-neuro sensorial network. It is possible to conceive a neural network that posits 'feeling' as that which is conducive to the holistic configuration of the machinic computation of love as universal and absolute, and without 'falling' into the moralizing (i.e., normative criteria) aspects of 'selves' or 'subjects' of love, or in other words, a corrupt or degraded love (*Amor* and/or *Eros* as a bifurcating point).

Computing love, thus, implies the dynamics and mechanics of computer-in-love by asserting an AI agency as the embodied connection between 'intelligence' and 'sensations' in a threefold fashion of a machine's interaction with another machine, a machine with another sensorial system, and a machine with humans. All three are enabled through computation's symbolic encoding and its implied transcendental plane. To have or experience feeling necessitates not the prerequisite primitive conditions of sentience or cognizance as human or animal sensations, but rather, the degree of a system or computational machine's de/coherence of its semantic de/stabilization of a pain/pleasure principle, as holistically increasing or decreasing 'love' as quanta and qualia[6]—or, in other words, the increasing organization of a pain/pleasure principle (a dynamic order) seen as a transitive morphogenesis within a system (an intelligent machine's evolutionary growth) resulting in the emergence of *eidetic noema* that we call 'feelings.'[7] Turing's work on a mathematical theory of morphogenesis is also important here since it raises questions regarding symmetry and symmetry breaking in relation to the evolution of a morphogene, and hence can be extended in relation to the evolution of love. Is love that evolves symmetrically or otherwise reflected in its later phases?[8]

As such, love is constituted by feelings, and to feel is a co-genesis of sensorial-directional topological process. A process of mapping of space and time coordinates in correspondence to an intentional noetic-noematic signification of sensory data as transcendent to the mere facticity of 'pain' and 'pleasure' as 'emotive manifolds.'[9]
Love is predicated on a neural network—and I refer here to neural networks specifically in Turing's sense of fallible-learning-intelligent machines that are constituted by neural nodes. As such, love presupposes the complexity and superposition of data and input/output with the entanglements and complexification of pain, pleasure and indifference, and which explains the emergence of 'feeling' as such densified and compressed states/processes/nexuses—what I will explicate later as an emotive manifold.[10]
Turing contending that a universal intelligent machine can be configured on the basis of pain/pleasure input and output with a corresponding "character-expression" and "situation-expression" suggesting that the notion of 'love' can be construed as uniquely linked to intelligence, where the 'human aspect' can be construed in opposition to animality precisely through its invariance of computational mechanics. In that respect, computational models of love share with Neo-Platonists the top/bottom model of love as deduced from the intellect into the material, machine, and physical invariances.



A small B-type network from Turing's 1948 paper 'Intelligent Machinery'.

Turing and the Enigma of Love: The Illusion of Free Will

Free will is repeatedly debunked by physicalistic accounts of love, which at their 'core' are transcendental. The inevitability and spell of love (Cupid's arrow) is a material causal determination, which as in the case of the chemistry of love (Goethe's elective affinities) subvert the bonds (*vincolis* in Bruno's sense) of love through the objective mediation and interaction between elements, forces, and substance composites. As such, love with its physicalistic genealogy renders free will an illusion since it is informed by interactionist explanations of one's "falling in love" as a causal inevitability; love as a choice is hence an illusion.

But what if we adapt this physicalistic vantage point to a connectionist explanandum *à la* Turing? What if factors of randomness are built-into the computational machines and as a result, re-describe the notion of 'choice' not as a selection menu but rather as an ongoing process of extemporizing possible interactions, and, as in a complex computational systems dynamics, the degrees of 'freedom' are defined by intensities or amplitudes of tendencies ('Will') or as degrees of choice?

In his essay, *Time and Free Will*, Bergson cites Darwin in observing the physical manifestations of love and thus grounding it in a physicalistic perspective reminiscent of Dante:

> *There are also high degrees of joy and sorrow, of desire, aversion and even shame, the height of which will be found to be nothing but the reflex movements begun by the organism and perceived by consciousness. "When lovers meet," says Darwin, "we know that their hearts beat quickly, their breathing is hurried and their faces flushed."*[11]

With great insight, Bergson traces the problem of free will to that of time being conflated with spatial divisibility and motion:

> *It is to this confusion between motion and the space traversed that the paradoxes of the Eleatics are due; for the interval which separates two points is infinitely divisible, and if motion consisted of parts like those of the interval itself, ... identification of this series of acts, each of which is* of a definite kind and indivisible*, with the homogeneous space which underlies them.*[12]

Following Bergson, we can contend that free will occurs *in time* and not in its spatial analogs and as such, that freedom is a degree of determinacy of a given intensity or 'motion.'

Free will ought to be construed as degrees of freedom (i.e., randomness) to will (i.e., behavioral tendencies), or what we can conceive as a lifeform expressed intersubjectively as intentionality. Such intentionality is induced from the connectivity between subjects as objects and not their first-person perspectival stratum. The Ich-raum and the Ich-körper (following the line of phenomenological analysis of Husserl and Stein) are corporeally defined by a directional and orientational constitution of the 'body' as the manifold object onto which subjectivity is generated.

Free will and probability are the key conceptual duo in Husserl's Experience and Judgment, articulating kinematic and machinic organization of bodies and randomness as long as the subject is not misplaced within the category of subjectivity (namely, first

person perspective), but rather, realigned with intersubjectivity as the degrees and scales of relative organizations of agents (free will) or agencies ("order out of chaos" or nascent orders out of randomness). Through time, recursiveness and repetition of input/output turn degrees of freedom that were first introduced into a system as random into a tendency or a 'will.'

Copeland accounts for Turing's assertion on free will as connected to the probabilistic organization of the brain, stressing that:

> *In his essay 'Can Digital Computers Think?' Turing raises both the possibility that "the feeling of free will which we all have is an illusion" and the possibility that "we really have got free will but yet there is no way of telling from our behavior that this is so". Turing discusses partially random machines further [...] where he mentions the possibility of including in the ACE a "random element, some electronic roulette wheel."*[13]

Interactionist theories of love either negate free will as an illusion or else enable it by positing free will from an internalist or mentalistic stance, hence purporting a mind/body dualism through which a first-person perspective is unmitigated with a third-person perspective and which leaves out a consideration of their intermediate second-person perspective as what I would discuss later in reference to "black boxism"—a conversion of input/output feedback.

Functionalist theories thus remain connected with their causal umbilical cord to the efficacy of computational apparati that are equally mechanical and abstract. And yet, as Reza Negarestani asserts:

> *In reality, neither functionalism nor computationalism entails one another. But if they are taken as implicitly or explicitly, that is, if the functional organization (with functions having causal or logical roles) is regarded as computational either intrinsically or algorithmically, then the result is computational functionalism.*[14]

A connectionist theory of love (following Turing but without singling out computational functionalism as the sole path) would disentangle degrees of freedom (randomness) from will (decision). Turing's interpretation of the decision-problem or paradox is crucial to conceptualize the connectivity between randomness and decision within a B-type machine.

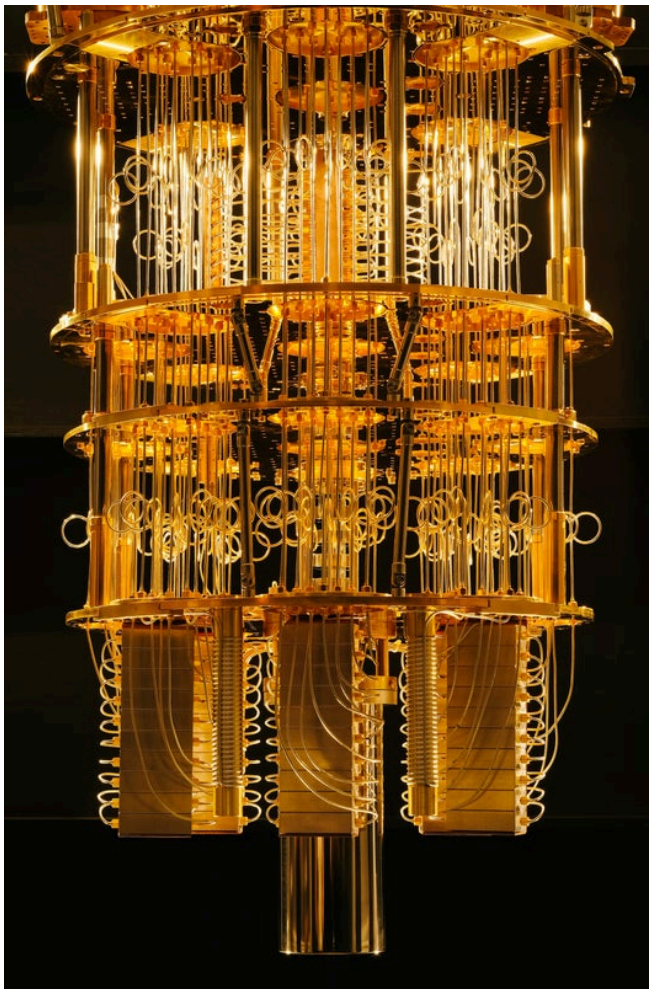
Turing's view on the decision-problem (*Entscheidungsproblem*) helps us in constructing a type of an intelligent machine based on the interplay between 'randomness' and 'decision' and as related to fallibility and computational learning agents. As such, these agents learn from errors of the computing of input and out in correspondence to pain/pleasure/indifference feedback.[15]

Unlike Wittgenstein's concept of the "language game" which implies rules but not laws, Turing's AI learning agents rely on a feedback process, which modifies the 'rules' without changing the 'laws' (mechanical, computational, or logical and mathematical). And inasmuch as Wittgenstein's approach in *Philosophical Investigations* suggests a more or less behaviorist reckoning with free will, Turing's connectionism allows a greater explanatory flexibility in defining the dynamics between 'rules' and 'laws' without assuming the ontological primacy of either a "black box" inner-systemic or a lifeform as intra-systemic complexification.

As such, free will is construed as the connectivity between de-randomized or organized rules based on "morphogenic" laws—namely, mathematically formulated or expressed (without altering the 'game,' be it AI, machine, brain, organism, etc.) in an anti-Darwinian or contra evolutionary fashion. As Turing argues:

> *[A] picture of the cortex as an unorganized machine is very satisfactory from the point of view of evolution and genetics. It clearly would not require any very complex system of genes to produce something like the A- or B-type unorganized machine. In fact, this should be much easier than the production of such things as the respiratory center.*[16]

According to "Turing's degree," any measure of the non-computability inherent in any solution overcomes the binary nature (yes/no) typically connected with a mathematico-computational conception of a computational complexity theory. As such, it would hence relegate un/decidability to the infinite character of an intelligent machine, where (following Church and Gödel) an inexhaustible number of 'problems' as well as 'solutions' may rise given infinity. Inasmuch as decision can be given either as 'yes' and 'no' or else remains 'undecided,' free will is posited from the degree of decidability with its random factors as well as its infinite sets.

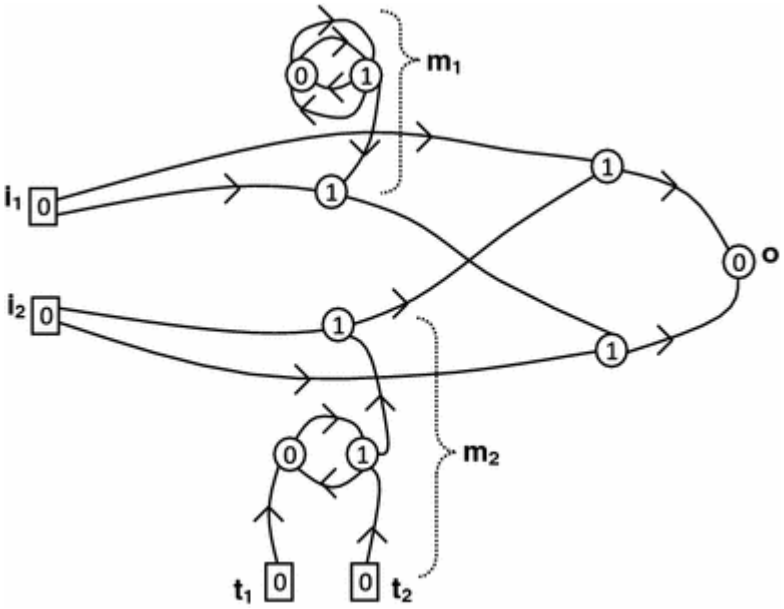


An IBM Q cryostat used to keep IBM's 50-qubit quantum computer cold in the IBM Q lab in Yorktown Heights, New York on March 2, 2018. IBM Research Flickr.

Sublime Computation

The Burkean concept of the sublime—as opposed to the aesthetic conforming to the Kantian harmonized, bound, and enframed experience—is marked by a gliding axis of pain and pleasure, whereas the dynamic amplification of quanta and qualia interchange along the sublime phenomenal constructs, like that of love, manifest the enigma of a complex and multiple sentience and cognizance without its reducibility to its atomic parts. In the earlier Wittgensteinian sense, we can thus assert that there is no "picture" of love unless one altogether dismisses 'love' as an emotivist fallacy reducible to a sensation, which in turn is contradicted by the very fact that, atomically speaking, "there is no such sensation" as 'love.'

Turing's P-type Machine (with its pleasure-pain input/output) allows—as with a connectionist paradigm—to view the complexification of sensations (interchangeably of pain with pleasure) within the framework of the computational dynamics of 'love' as it emerges from the black box of the sensory feedback of input/output, gathers momentum, and engulfs the lover and the loved ones in an intertwined interplay as subjects/objects without assuming a first-person perspective that would assert internalist or subjectivist information. This epistemological behaviorism does not negate a phenomenological constitutive grounding but rather bypasses it as a pre-requisite for computing love's black box (enigma) as the entanglement of causes and affects (rather than effects) and as defying the demarcation of objective and subjective boundary conditions.



Alan Turing: p type machine

Furthermore, the fluidity and topological transformation of such boundary conditions are manifested in 'love's' traversal trajectories between pain and pleasure. There is no greater pain than the one incurred by a loss or infliction of love (and, as such, beyond a Sadomasochist principle—a feedback loop as opposed to love in which the symmetry is never grasped but assumed as a black box through which the input/output dictates a dynamics of love) as an emergent process ('negative' in the cybernetic sense) where rather than being transparent and conspicuous, love remains enigmatic.

Insofar as the Kantian concept of the sublime (*Das Erhabene*) is a concept marked by the unbound and un/intelligible as constitutive to a sensorially deprived or empty experience, the Burkean sublime is a 'negative' feedback through which the sensorial is not entirely denied or dismissed but rather is dynamically reversed and registered as an 'input' or 'output' of pain/pleasure.

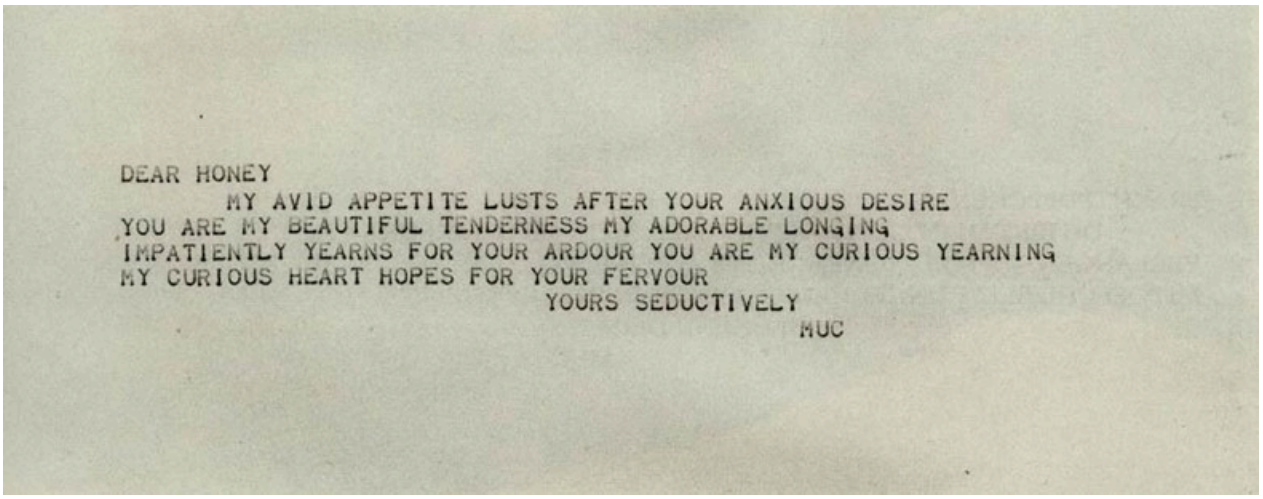
The grounding of such pain/pleasure is not to be found with the system, machine, or computational model but rather 'outside', in the embedded or interwoven modes of the 'world' and 'sub-worlds' (*Welt and Umwelten*) and what in Wittgenstein's sense we can regard as Lebensformen. Such Lifeforms determine (apodictically) 'how' and 'when' we perceive an input and or an output as pleasure or pain.

Love is a computational configuration of 'pleasure' and 'pain' as symbolically registered as a 'lifeform,': a lifeform that has a symbolic stratum and encoded as signal as well, but without being reduced or reducible to any given sign, act, or form of signification. And like most Lifeforms, their irreducibility to logical inference or mechanical interaction (since they set forth their very criteria) expels love from the pure sensory (e.g., pleasure or pain) and purely mechanical (input and output), since it is always the system's trajectories in terms of connectionism. Lifeforms entail the behavioral dynamics that are assumed by a black box without implying its 'logic' or 'mind.'

The principle of indifference, or what can be regarded a la Turing as 'undecided,' is found in Burke's conception of the sublime, as articulated in his *A Philosophical Enquiry into the Sublime and Beautiful*, in opposition to the concept of beauty and as being induced by "negative" physiological and psychological experiences of fear and revulsion and an identification of "negative pain" as sublimity.

Burke cannot be accused of conceiving the relation between pleasure and pain as that of simply phenomenal and psychophysical opposition. Rather, his triadic conception of the sensory axis of psychophysical experiences is positioning indifference as the sensation/condition, which relegates pleasure with pain as sensory extremes or poles.

The significance of "language games," for Wittgenstein, introduces the physical principle of pleasure and mostly of pain and can retract and invigorate the learning agency from the domain of pure rules (i.e., logic) with the possibility of pure play (i.e., experiential combinatorics). Emotive manifolds allow conditions under which pleasure and pain are enacted not as polar opposites along the axis of sensations, but instead as sensorial manifestations of generative indifference. Generative indifference can be construed on two different planes that involve the wiring or encoding of sensation as pain, pleasure, or 'undecided' and functions as a neural net or node.



Love letter procedurally generated on the Manchester University Computer by Christopher Strachey, 1953.

The first plane relates to the quasi equilibrium state/s in complex dynamical systems in which neither 'order' nor 'disorder' is discernable in terms of the system's entropy or "strange attractors". Such a state is typically behaving as fluctuating and oscillating conditions, which are 'indifferent' to any anisotropic unfolding of processes. Emotive manifolds vacillate between 'chaos' (pain) and 'order' (pleasure) or vice versa through a continuously interrupted indifference to either. The second plane mitigates pleasure and pain through the axis of indifference and not opposition (as suggested by Burke), and this indifference as opposed to either pleasure or pain is generative precisely because it can go or unfold either way depending on whether the agent is interacted with as 'play' or 'game' of love with corresponding joy or disciplinary repercussions associated with each case. The concept of generative indifference can be construed in relation to three constitutive processes:

(1) A 'play' not yet regulated into a 'game,' with more extemporizing and less axiomatization occurring.

(2) CDP (complex dynamical processes), as in the case of dissipative structures, fluctuate in states of quasi-equilibrium and, as perturbations in non linear systems, can generate spontaneously and recursively nascent 'orders' or organizational identifiable aesthetic 'events' within the system's otherwise indifferent 'chaotic' (order/disorder) parameters. The emotive manifold thus assists us in addressing the grey zone or twilight zone between formed or signified sensations/concepts (such as 'pain') by designating a quasi-equilibrium flux that is generative precisely since its indeterminacy and flux are equally logical, linguistic, and phenomenal.

(3) The concepts of 'pleasure' and 'pain' as underlying organizing principles are mitigated by a general field of indifference which, like the Burkean axis, is transitive and non-relative to either poles.
The emotive manifold is extended between the dynamics of play (and chance) with its variations, improvisations, and extemporizing as often enacted by children and as noted by Wittgenstein himself, and the regulated regime of game (and accidents). Unlike the Kantian model of analyticity and contingency, the emotive manifold is structured on the complex dynamics between laws and rules and is a lifeform in itself—a testimony of how the possible and the actual are interchangeably flipping sides of order and disorder, or stochastic order and deterministic chaos.

DUCK SWEETHEART

MY PASSIONATE INFATUATION EAGERLY YEARNS FOR YOUR CURIOUS PASSION. YOU ARE MY LOVING PASSION: MY BEAUTIFUL HEART. MY HUNGER FERVENTLY PANTS FOR YOUR LOVELY HUNGER. MY CURIOUS DEVOTION LONGS FOR YOUR CHARM.

YOURS FONDLY

M. U. C.

Love letter procedurally generated on the Manchester University Computer by Christopher Strachey, 1953.

Love and Boxism

Black box is typically applied as a topological (heuristic) construct that stands for what amounts to the transmission between input and output—be it a brain, algorithms, or transistors—without assuming phenomenologically a subjectivist or internalist *topos*. As Mario Bunge had contended in relation to phenomenological theories in physics, "black boxism" carries the mark of causal inferences, which are assumed within a theory

without being proven or demonstrated. Thus, the input and output collected or generated by a scientific theory does not necessarily entail its "black box" as a construct derived from its inferences.

"Black boxism" exemplifies the enigma of love where the PP (pain/pleasure – input/output) of sensory dynamics assumes the 'lover', 'mind,' or 'heart' in a transitive yet seldom symmetrically congruent relation between the agent and agency, or the subject and object of love.

Typically, love is associated not only with pleasure and exaltation but with pain and torments. The fatal love of the romantics, which may lead to illness and death, is an amplification of the 'enigmatic' aspect of love turned into the "riddle of nature" (Hegel) whereas its "black boxism" is literalized or rendered materially as a blinding and annihilating force.

We never quite know if transparently love is reciprocated and if its reciprocity is isomorphic (think of the love for God!), and hence 'love' remains a captive of the opaque and impenetrable aspects of "black boxism" where its 'causes' and 'effects' are converted and transcoded to inputs and outputs interchangeably and collapsing in the open (an opening of the box experiment) to either the 'object' or 'subject' of love.

Despite Kant's critique of Burke's psychologistic take on the sublime in his *Critique of Judgment*, Burke, nevertheless, captures an aspect of the sublime which applies to love: a dark, sinister and 'negative' dimension that binds it to neither the subject nor the object of infatuation, and precisely for that reason, according to Burke, the sublime is ever more powerful an experience than that of the beautiful. Rather, the sublime (or love) is bound to a black box, and not in the Kantian epistemic sense of dynamic or mathematic conceptions of the sublime, but instead, to a particular dynamics that converts/transcodes input to output.

Black boxism does not deplete the significance of a first-person perspective with respect to love, but it assumes a third-person perspective for its constitutive analysis, which in turn strongly delineates the genesis of 'love'—above and beyond its biological horizon (Maturana)—in the physicalistic realm of mechanics, chemistry, and dynamics, leading us to computational models (Turing) of intelligence and fallibility and love.[17]

To fall in love, the cadence and inasmuch its heavenly Icarusian ascent, invoke Maurois and Turing assumptions involving being in/fallible in terms of love and intelligence, both of which involve a machine and a 'brain' of a B-type and that is dynamically informed by errors and their feedback input/output only to subvert the course of 'love' away from

nature (Darwin) to its inclusive mechanically dynamics emergence as a second nature (Hegel). Insofar as secondary nature is assumed abstractly and teleologically, the immanence of nature is given through concrete evolutionary biological instantiations. Incidentally, a first-person perspective does not explain the mechanical or dynamical principles of love, but rather delineates its own 'blind spot' or 'imperceptible limits' in assuming the field, nexus, or medium of love as based at least on degrees of resonance and at most on reciprocity. A first-person-perspective account of love is hence ever-egological and never ventures into the Platonic realm of Ideas or Spirit (*Geist*). And insofar as 'love' is sense-bestowed only if it is assigned to a transcendental plane, it requires an explication—physicalistic by character—that involves 'objects' and 'objections,' that is, the input and output of love's elusive and enigmatic black box.
Is the enigma of love doomed to remain in vacillation between a black box of sensations and/or a transcendental plane of ideas, or else, either analyzed as physically constituted processes or captured through a computational calculus of its inputs and outputs? Computing the enigma of love is precisely reasserting a transcendental computational plane—which is never simply reducible to either the immanent energy and mechanical forces nor the transcendent codes and mathematical forms—that it stretches between mathematics, anthropology, and biology.

Footnotes

1. Jorge Luis Borges. *Labyrinths: Selected Stories & Other Writings.* Preface by André Maurois, edited by Donald A. Yates & James E. Irby, New Directions Publishing Corporation, 1964, p. 9.

2. B. Jack Copeland (Ed.). *The Essential Turing: Seminal Writings in Computing, Logic, Philosophy, Artificial Intelligence, and Artificial Life plus The Secrets of Enigma*. Calderon Press Oxford, 2004, p. 394.

3. Dante Alighieri. *Vita Nova*. Einaudi Letteratura Italiana (Reference edition: Bemporad, 1932), p. 28; Dante Alighieri. *La Vita Nuova: The New Life.* Translated by A.S. Kline, CreateSpace Independent Publishing Platform, 2014, p. 31.
Love and a Gentle Heart Are But One Thing
"Love and a gentle heart are but one thing,
as the philosopher in his sentence wrote;
so they without each other live dare not
as rational spirit without reasoning."

4. "At that moment I say truly that the vital spirit, that which lives in the most secret chamber of the heart began to tremble so violently that I felt it fiercely in the least pulsation, and, trembling, it uttered these words: 'Ecce deus fortior me, qui veniens dominabitur michi: Behold a god more

powerful than I, who, coming, will rule over me.' At that moment the animal spirit, that which lives in the high chamber to which all the spirits of the senses carry their perceptions, began to wonder deeply at it, and, speaking especially to the spirit of sight, spoke these words: 'Apparuit iam beatitudo vestra: Now your blessedness appears.' At that moment the natural spirit, that which lives in the part where our food is delivered, began to weep, and weeping said these words: 'Heu miser, quia frequenter impeditus ero deinceps!: Oh misery, since I will often be troubled from now on!'
From then on I say that Amor governed my soul, which was so soon wedded to him, and began to acquire over me such certainty and command, through the power my imagination gave him, that I was forced to carry out his wishes fully." (Alighieri, p. 5)

5. Unlike behavioristic approaches (e.g., Skinner's), Turing's use of the notion of 'behavior' is neutral and does not infringe on epistemological dogmatism in relation to the nature of consciousness—an aspect that Wittgenstein struggled with.

6. By quanta and qualia, I mean here merely the quantitative and qualitative registering sensations of pain and pleasure as amplitudes and senses of the feelings associated with 'love' in a neural network.

7. Insofar as Husserl develops earlier in his *Logical Investigation I* the concept of noema as standing for an intentional object, in *Ideas I* he introduces the conception of "eidetic reduction" which later in *Experience Judgment* enables through the method of "free variations" of phenomenological descriptions to encompass the scope of either imaginary or real experiences as "feelings" charged with eidetic meanings as general types.

8. As Turing argues: "If chemical reactions and division are the only forms of physical change which are taken into account the argument above can take a slightly different form. For if the system originally has no sort of geometrical symmetry but is a perfectly homogeneous and possibly irregularly shaped mass of tissue, it will continue indefinitely to be homogeneous. In practice, however, the presence of irregularities, including statistical fluctuations in the numbers of molecules undergoing the various reactions, will, if the system has an appropriate kind of instability, result in this homogeneity disappearing." (Copeland, p. 525)

9. We can imagine, following the work of René Thom and Jean Petitot, the developing of a topological morphogenetic models for types of love through the dynamic modeling of surfaces.

10. "Turing's idea of neural-like structures was new and promising in the forties. A universal and very simple basic element (neuron with associated input connections) in A-type and TB/TBI-type nets guarantees that, at least from a theoretical point of view, any function or system can be implemented using Turing's networks. The philosophy followed by Turing was to use the same type of node everywhere in the network, the reason why the modifiable interconnections are also built up from the same basic nodes." Christof Teuscher and Eduardo Sanchez. "A Revival of Turing's Forgotten Connectionist Ideas: Exploring Unorganized Machines." *Connectionist Models of Learning, Development and Evolution*, edited by Robert M. French and Jacques P. Sougné, Springer, 2012, p. 162.

11. Henri Bergson. *Time and Free Will*. Translated by F. L. Pogson, London: George Allen & Unwin LTD, 1950, p. 30.

12. Bergson, pp. 112–113

13. Copeland, p. 391.

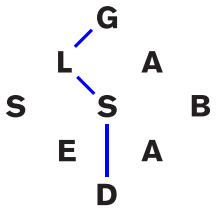
14. Reza Negarestani. “Revolution Backwards: Functional Realization and Computational Implementation.” *Alleys of Your Mind: Augmented Intellligence and Its Traumas*, edited by Matteo Pasquinelli, Lüneburg: meson, 2015, p. 140.

15. Teuscher and Sanchez.

16. Copeland, p. 424.

17. Humberto Maturana posits that the biological basis of love is connected to the length of maternity and languaging and hence determines the systemic evolution of the organism’s feedback more than simply the genes; and in what later he developed with Varela through the notion of autopoeisis. “The manner of living of a living system is realized systemically in an ontogenic structural drift (epigenesis), and is conserved systemically generation after generation in a phylogenic structural drift (phylogenic epigenesis). [...] Languaging, indeed, living in conversations as we humans do requires such an enormous capacity for consensuality, that we humans are all essentially equally intelligent, and the differences in intelligence that seem to exist between humans are not due to differences in their capacity for consensuality, but in their emotioning.” Humberto Maturana Romesin and Gerda Verden-Zoller. *The Origin of Humanness in the Biology of Love*. Edited by Pille Bunnell, Imprint-Academic.com, 2008, p. 78.

Adam Berg is an artist and writer living and working in Los Angeles.



JOURNAL > SITE 2. DARK ROOM: SOMATIC REASON AND SYNTHETIC EROS | 2019

Shattering of the Vessels

Alexandra Mason

The Passion of the Carcass vs. the Corpus: Flesh vs. Body

There is a difference between the body and the flesh, as Hortense Spillers has noted. What we consider to be the body is synonymous with legal personhood while the flesh (a category to which undistinguished black bodies, taken as a mass, are assigned) refers to the captive position that lies in opposition to all that the body represents. What Spillers describes as the "hieroglyphics of the flesh" refers to history imprinted on the body, which denotes one's social standing. The phrase both recognizes the 'realness' of phenotypic expression, while it attempts to encapsulate all the non-biological influences that go into racial categorization. Such hieroglyphics, written by the moment of slavery and courts of law, collapse past, present, and future of both "marginalization as well as political agency," in such a way that, "racism would land its blow on the body of the world for generations to come."[1],[2]

Civil War CDV of Gordon (slave) at the Baton Rouge Union camp during his medical examination. Photographers William D. McPherson and his partner Mr. Oliver, New Orleans, 1863. National Portrait Gallery, Smithsonian Institution.

The idea of blackness is one through which we can examine the ways in which visible human traits, results of genetic expression, are things around which whole lores and events (the recollection and organization of which is called *history*) can be formed. For the black subject specifically, this particular codification resulted, post emancipation, in becoming caught in a 'double bind' between slavery (*knechtschaft*) and Leviathan (*herrschaft*). The logical telos of liberalism in its political mode is to construct categories of men which precede the individuals themselves. Rights follow the fluidity of Reason. The language of rights ablates contingent facts of time and place so that the liberal citizen is a pure category, a logic of citizen-making that awaits an input and produces an output. A constitution constitutes man-as-citizen; constitution-as-machine, as-logic. In this move towards freedom we moved from more direct forms of domination to being encouraged to self-regulate the body within liberalism.

In *Testo Junkie*, Preciado describes The Pill as an "edible panopticon," an individual method of hormonal self-regulation in the form of birth control. In doing so, they offer a historical account of how this method of biopolitical administration, originally intended for use among white, suburban housewives, was the result of pharmaceutical data collected from Gregory Pincus and John Rock's research trials for the contraceptive pill, Enovid, on low-income, Puerto Rican women in 1995.[3],[4] In these instances, the use-value of objectified flesh, or more precisely, the pain and discomfort of commoditized life sublimates erotic discharge for other mundane exercises of power. Such bodies have, historically, only been recognized within a eugenic framework geared towards the inhibition of psychic energy and disregard of one observable phenotype or subgroup in favor of the sovereign and its triadic model of the family. Preciado also notes that this Pavlovian regime of tease and denial usurps familial introjection and reconditions the libido to invest in, serve, and obey regulatory mechanisms of the disembodied panopticon—not anti-œdipus, rather, *ultra-œdipus*.

Within capitalism, the survival and life of the human is determined by forces of production. Marketing mechanisms exploit our unconscious and activate the death drive, the nature of which can be examined as our push towards wholeness beyond the limits of experience. These larger social systems activate processes such as our neural reward systems and help organize our drives, and these drives, taken outside ourselves, begin to solidify before us into social structures. Our bodily processes signal outputs towards the surrounding medium in which they are submerged in ways that are primordial and evolutionary (e.g., shortness of breath, sweating, etc.), but in this relationship between the body and its culture, routes of libidinal desire are also written, acts of symbolic exchange that link together these 'responsive' nodes to create patterned responses and narratives. Taken together, the external world to the proletariat is a machine environment. Hardly controlled by any one person, to navigate this environment is to understand how to live amongst the machine.

Ultra-Oedipus: *Libido Recouped by The Imaginary*

In order to explore the relationship between bodies, sexuality, and technology, we could attempt to fathom a world in which sex robots with advanced AI capabilities were made for mass production and distribution, creating easy access to 'intelligent' and responsive toys made explicitly for the purposes of human sexual desire. Presently, because prototypes of such technology keep us from examining a significant enough number of individuals due to the inherently discriminatory nature of capital acquirement, we must

break down this argument into smaller components by examining the nearest available analogs. While AI sex bots do not yet exist beyond the prototype stage, 'life-like' sex dolls do, and, separately, companies and researchers are attempting to perfect artificial technology, most notoriously through the use of home technology such as Alexa, and through social media platforms like Facebook.

What happens between the purchaser of a sex robot and the toy during copulation is an act of play which pairs the organic with the synthetic. Such displays of desire can find their siblings in BDSM 'play,' specifically within sadomasochistic exchanges, and also within the world of porn. BDSM could be understood, in some respect, as adding non-procreative erotics and an element of play to the act of sex. Here, 'BDSM' and 'porn' are meant in more figurative terms, away from their normative connotations. The former refers to the idea of sexual play and an exploration of power dynamics in the broadest sense, and the latter to images, writing, or art (collections of symbols) intended to arouse. Though typically thought of as outside of society-at-large, elements of BDSM can be found in mainstream porn films and popular society, and 'vanilla' society contains fetishes as well, just those that are deemed normative. Thus the question of Artificial Sexuality forces an exploration of what it means to have a pornographic imagination, because the basis of what comes from exercising these faculties, which ultimately engender semi-solidified imaginaries, are the result of libidinal outputs from our bodies as desire-producing machines.

Attitudes towards technology within popular discourse can sometimes veer towards overzealous optimism or technophobia. Visions of the future, whether dystopian or utopian, are anticipations of that which is 'not yet.' However, such visions can (particularly when represented in film, literature, or art) also function as critiques of a present state or historically situated forewarnings. Thus, it is difficult to envision a future that is not, at least somewhat, influenced by the particular time in which the schema was made. We cannot overlook how technology is a byproduct of social ingenuity and labor, and might embody the frameworks of a culture by design.

Stellarc: *Third Hand*, 1992.

It is only through a thorough analysis of how political subjects are socially and historically constituted that we may understand how traces of libidinal desire become rerouted and encoded on subjects, and how this eventually comes to form recognized collectives that are codified and categorized. We should make a distinction between the idea of culture in the social sense and culture in the biological sense. In the social sense, culture is the accumulation of semiological objects and social artefacts (language, signs, customs, etc.) among a linguistic species within a specific geography and epoch. Culture is what Sylvia Wynter referred to as an "autopoetic turn" toward the sociogenic from the phylogenetic and ontogenetic, dormant objects animated by cross-pollination over a timescale (history)—simultaneously, a replicative process and an archive, which elucidates the relationship between the material production of life (*zoe-bios*) and the virtual production of information (*logos-mythos*).[5] Cultural reality is not an inert system of signs; rather, such symbols orient our understanding of reality. Therefore, paying

attention to symbols is the basis of a narrative: that it *makes itself real*. Rather than being in a binary of real vs. not-real, a narrative conjures approximations of reality in degrees of making-it-real.

Mnemo-Libidinal Inscriptions: *The Erotics of Temporality and the Alien Power of Capital*

The power of collective memory lies not in the memories themselves but rather in how they haunt and manipulate the future, like specters. The ghosts that haunt us the most are not the metaphysical remains of people who have died but rather the past, collective experiences that have burrowed into the cavernous unconscious, and which seek to feed and maintain themselves there. All organic animated things are composed of inorganic matter which self-organizes through chemical and physical processes, and culture itself can be seen in a similar light as a self-organizing system composed of bodies. There is a reciprocal relationship between the body and its culture, which functions as the primary site of politics. The more one alters the culture within which the body is submerged, the more the body is presented with a variety of environmental 'selective pressures.' In this process, the body's awareness of what it considers the world to be is altered. Moreover, some instances that we consider to be an essential biological state of affairs are little more than mythos, a vulgar understanding of the mechanisms within the body. Beyond cultural speculations and narrative, there is a relationship, and at times a tension, between our biological processes and social life.

As we interact with technology, we change the medium in which we exist, which, in turn, modifies the ways in which we engage with others and view ourselves as subjects, sometimes in ways that we can foresee, and sometimes in ways that are unbeknownst to us. If we view technology not just in instrumental terms but as cybernetic processes of self-organization, then capitalism can be seen as a technology out of which bodies are formed, organized, and shuttled around in particular ways. These different social structures correspond to specific libidinal patterns, and technical infrastructures of 21st -century capitalism have intensified this cybernetic mode of organization. As we recognize changes to our bodies and minds, due in part to feedback loops between us and the technologies we engender, we understand our future selves as alien to the present. Looking into the future, we anticipate a gradual sort of ego-death which arises out of acts of symbolic exchange, the particularities of which are influenced by biological and cultural forces and facilitated or amplified by computational infrastructures.

In this view, we can ask: What do we mean when we say, "I feel the same" or "I feel different?" "How do I feel respective to the other selves I have been?" The operational dynamic here is that of time.[6] In the movement from organic to synthetic, the growing intimacy between humans and machines deepens. Typically, in order to make such statements, one points to ideas like the notion of accelerating technological change to claim that more 'advanced' or complex technology will close the gap between psyche and machine. Yet, we can also argue that over time, as we begin to integrate more kinds of technology into our social lives and increasingly use it to mediate interactions between us, we begin to change our perception of what is human-like. Over time we unknowingly crawl ourselves closer to a more muddled definition of that which is mechanistic by lowering our standard for what that entails.

Normative temporality is organized as the linear passage of three domains: past, present, and future. The 'future' then, is a perceived endpoint that exists as a possible outcome of a set of given relations. Our relationship to the idea of the future is that while it appears as new, it is really the culmination of collective will that creates a narrative out of a genealogical set of relations that are determined to have come before. It is seen as a 'natural' progression from said events as an endpoint, but is really also the picture of a particular collective desire. It might be more accurate to refer to what is colloquially known as the future as 'that which is not yet,' an infinite number of possibilities that confront us.

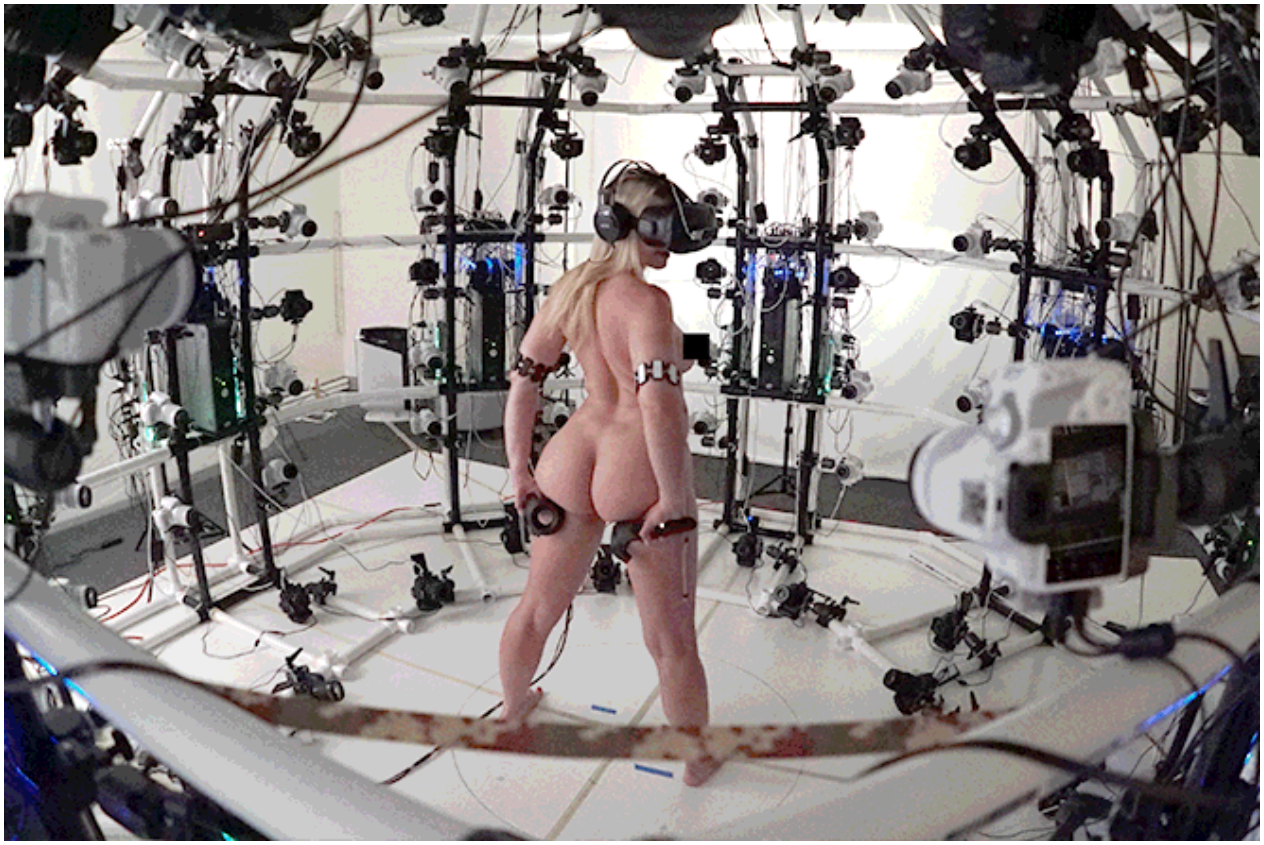
Modern secular society presents us with a vision of freedom through individualism, yet it simply confronts us with new versions of the divine. Capital, accumulated Value, acquires its own autonomy. Capitalism masks the intricate social relations that constitute our being. A product is something made by the labor power or some 'we' but when one encounters it in the form of the commodity fetish, these relations are obscured. Under capitalism, our social relations are centered around the production of commodities and economic exchange and, as such, Capital-mediated relations appear to us as having objective forms of value. In its alien drive to reduce socially necessary labor time, capitalism institutes specific forms of spatial and temporal organization of behavior (e.g. regimes of repetitive labor tasks, categorization, calculation, probabilistic risk assessment, facial recognition) all underlain by automation and exchange.[7] The circulation of Capital is a continuous one that 'calls for' and is accompanied by cultural myths that substantiate a progressive notion of history. Within this mode of production, technology serves a particular role within the labor process, which is to increase productivity.

"Master of the Banderoles", engraving of prostitution from the 15th century.

Synthetic Bondage: *Libido Recouped by The Synthetic*

It is generally understood that suspension of disbelief is an intrinsic component of enjoying pornography. However, our understanding of the actual nature of sex work as it pertains to the production of pornographic films is also obscured within capitalism. Liberalism as a system in which one must argue for private rights, publicly,[8] constructs narratives around pornographic actors that tend to shy away from making comparisons between sex work and 'real' or 'civilian' work, and colloquially, pejoratives are sometimes used to delineate between those who are chaste and those who are depraved. We can simultaneously grant the notion that prostitution is "the world's oldest profession," meaning it predates capitalist exchange, while also examining how and why this occupation manifests through history despite its marginal status, much as we can both recognize that slavery as a concept has existed throughout recorded history, while still examining the particulars of chattel slavery because of what surrounded it. Much like in other, more socially acceptable jobs, elements of the true nature of mainstream

pornographic production (particularly that it requires hours of arduous labor to produce a scene) are obscured under the socioeconomic paring that engenders the fungible elements of the capitalist world.



Performer Anikka Albrite's movements digitally rendered as a virtual image via Camasutra VR's motion capture studio. 2017.

Capitalism hijacks our sensibilities by instrumentalizing our cognitive blind spots and our tendency to manufacture meaning though the mediation of symbols and images. These images often confront us in the form of advertising, yet this is not the only way in which this spectacle takes shape. Capitalism itself bets on its ability to be a producer of desiring forces and a conduit for libidinal investments. Tapping into this productive power, however, comes at a cost. In this case, organic material is sacrificed towards the creation of synthetic machine-like intelligence. These cybernetic processes work similarly to the process of neural conduction: collection of the signal, integration of the signal, and distribution of the processed information. But if the constitution of the cybernetic signal is understood in libidinal terms, the muck that this signal is drawn from can also serve as the site of repression, sublimation, and jouissance.

The death drive is dissipation of libidinal intensity, the material expenditure of energy and time within the space of reality. Picture billions of substrata, each one a cell containing units of residual solar energy, irrepressible impulses contained within a body or a form. The flows of these substrata, bodies, or forms create differentiating fusion and exchange, expending this energy via the transduction of labor.

> *The wretched and the sordid are in fact essential to the attainment of the sublime…Masochism is a movement which integrates the lowest impulses with the highest; it is a story about falling in order to ascend.*[9]

Davecat, one of the most prominent advocates of 'synthetic love,' lives with two real dolls, Sidore, whom he considers to be his wife of over 15 years, and Elena, who is both his mistress and Sidore's girlfriend. When asked about meeting his silicone wife for the first time, he noted, "It seemed perfectly normal for me to treat something that resembles an organic woman the same way I'd treat an actual organic woman."[10] Moreover, what makes Davecat interesting is that, while he calls his experience "natural," he does not pretend that his dolls are human, and in fact claims that Sidore's charm lies, for him, in the fact that she is partially synthetic.

Davecat and his sex doll wife Sidore. Photos by Roc Morin, 2014.

Davecat, in an attempt to express his ideal form of romantic and sexual desire, brushes up against the uncanny valley to an extent that might make many uncomfortable, yet he still prefers this lifestyle more than relationships with organic women because he is self-admittedly risk averse when it comes to taking emotional chances. In order to avoid the pain of breaking up with a long-term partner, Davecat would rather opt for the ease of a relationship with his "perfect partner." However, even Davecat's carefully constructed universe is not without pain. In regards to making repairs to his synthetic wife, he confesses that, "When her body comes close to falling apart through entropy, I'm pretty cut up about it, as anyone would be when facing the mortality of a loved one."[11] Ultimately, though one could argue that the introduction of such robots on a mass scale might be beneficial for some, especially introverts, we must note that even within our alternatively constructed solutions, we may never escape certain unpleasant experiences, like those related to anxiety and dread.[12]

The internet's progressive infiltration of real space is representative of our movement towards the inorganic recuperation of libido, as it represents a latency path that facilitates communication between physical objects. Increasingly, as improvements are made to the network, more hardware is shed or made more compact. Though early conceptions of the internet latched on to terminology that represented the interconnectedness of its users, like the 'hive mind,' it was naive to think that use of such technology, particularly in social media interactions, could escape the medium in which it was used. Technology, here loosely defined as both tools and epistemological processes, is altered and molded by the methods which surround it while it also facilitates circuits for the libidinal energy it draws from. While social media has the ability to link users globally, it has also intensified myopic ways of seeing by presenting users with the ability to 'choose' their content. The internet actually singularizes the spectacle into one feed.

There exists a relationship between the subject's pornographic imaginary and the political sphere, with the former being a vulgar reflection of the latter. Pornography (which in this instance refers to images, items, and subjects associated with the sex trade) functions as a receptacle for hidden desires. Though the deviant fantasies associated with such images and symbols are seen as verboten in the surface of our daily lives, such a view obscures the alien nature of what occurs within our day to day experience where we transcribe our desires into symbols, tracing threads of socio-historical narratives. In a sense, politics is how an agent chooses to construct their subjectivity, and thus is about the collage of internal objects that subjects choose to openly show to others (or feel they

must adhere to) within the public sphere. Much like in the relationship between the white collar realm and the economic underworld, constructed symbols that circulate within extrinsic systems that we encounter create their antithesis from which an underbelly is formed. Here, pornography is not only the 'publification of the private,' but a technology of pleasure that conceals its public constitution. Additionally, though some of the language that is related to pornography and sexuality links the idea of pleasure to normative ideas of what is 'good,' unfavorable experiences such as pain and violence are inseparable from the pornographic imagination.

Justine; or, The Misfortunes of Virtue, erotic novel by the Marquis de Sade, 1791

Libido Recuperated by The Pornographic

Despite the ability that Sade has had to perpetually shock and disgust many readers, one could argue that his stories, in fact, lack sexual abandon. Clinical and methodical, his description of sexual acts is typically removed and matter of fact. Andrea Dworkin

unintentionally illustrates this point in her harrowing description of Sade and his real-life misdeeds. In *Pornography: Men Possessing Women*, Dworkin dedicates an entire chapter to the author, and within it, she spends most of it depicting Sade's real-life predilection towards acts of violence and degradation, as opposed to providing an in-depth analysis of his work. To make him seem as unsavory as possible Dworkin finds she must depedestalize him and posits that, "In Sade, the authentic equation is revealed: the power of the pornographer is the power of the rapist/batterer is the power of the man."[13]

From there, she offers an analysis of Bataille's work, which is often lumped into the same transgressive cadre as Sade. She refers to this kind of text as "high class literary pornography," or works in which force and violence are thought to be laden with meaning because they bring one closer to death. She notes:

> *The violence of death is the violence of sex, and the beauty of death is the beauty of sex, and the meaning of life is only revealed in the meaning of sex, which is death. The intellectual who loves this kind of pornography is impressed with death.*[14]

An argument that runs throughout Dworkin's text is that pornography encourages men to eroticize the humiliation of women as a psychological act of retaliation because her status as the sexual object of male desire subordinates men to their own desires, which they project onto the performance of femininity. This illusory feeling of temporary powerlessness is one way in which the man comes to resent the woman. We may grant this argument at least some partial truth in the sense that it expresses the idea that relationships between individuals categorized as groups are structured by historical processes, social and economic factors, and could possibly even agree with her comments about the fascination with death among "high class literary pornographers" like Bataille (something that he would probably agree with, to an extent). Still, if we look at those that have cited Dworkin since, one could argue that there is a particular kind of thinker who is obsessed with Dworkin's notion of sexuality because it poses a theoretical challenge to their own. Her depiction of pornographic works become perversely intriguing because, in an effort to appall, Dworkin unintentionally writes salacious accounts which work to entice a certain type of sadist.

Stills from Pier Paolo Pasolini's *Salò or the 120 Days of Sodom* (1975).

For all the unpleasantries that Dworkin's conception of gender presents, we must keep in mind that positing a particular brand of humanism as a retort to such concerns can sometimes be a nefarious, albeit subtle, way of preserving pre-existing norms. When examining pornography clinically, we can note that, while a certain fantastic quality is a prerequisite for enjoyment, a certain level of realism must also be maintained. In other words, if we conceptualize pornographic work as a collage of symbols, we can note that the components of that picture, the objects,[15] that make up a pornographic scene must also be granted a certain degree of 'reality' in order for such scenes to work as well. For instance, a scene between a stepmother and son only works if we first have a conception of what such objects or social relations, as they are presented to us within the world, denote. However, because this 'reality principle' is, in some cases, the result of libidinal processes underlying the symbolic organization of perception, it is common to fetishize, in private, ideas that we would rally against within the public sphere.

Jamie Gillis and his "On the Prowl" series of pornographic films can be seen as improvisational works of acting that function as a meta-commentary on the medium of film and on the content of pornography. In these gonzo works, Gillis approached various men with the premise of being able to have sex with a porn star (typically amateur) for free. The charm of these films—though they display women, and sometimes Gillis himself, being humiliated and degraded—lies in the method they use to utilize

pornographic imagination. Gillis, in actively trying to convince the average consumer of porn to become part of the staged act itself, blurs the boundary between the voyeur and exhibitionist. This format presciently comments on, or speculatively realizes, the period of 'reality pornography' which followed. What's important is that neither does Gillis try to couch his videos under the guise of art, nor are his videos presented as one-dimensional and flat "attempts to pawn off abused women to pervy men." Instead, he interjects himself as a willing participant in many films as well, and lets the actresses or actors expose their lines of thought to him. In these exchanges, Gillis helps show that sexual desire, humiliation, and guilt are bound to one another, as he acts as a priest, or documentarian, simultaneously jealous and pious.

Still from Radley Metzger's *The Opening of Misty Beethoven*, erotic retelling of George Bernard Shaw's classic play *Pygmalion*, directed by Radley Metzger, 1976, USA, 86 minutes, starring Jamie Gillis, Constance Money and Jacqueline Beudant.

More so than a fascination with death itself, sexual impulses and libidinal desires follow a death drive, or in other words, such flows ultimately veer towards ego death. For example, cuck porn typically depicts a scene where a man (usually white) watches his wife (also usually white) have sex with another man (who is usually black). Beyond the knee-jerk emotional reactions one may have to the idea of a black body being

"animalized" in such a way, such scenes give us important insights into the collective imaginary of which we are a part. While such fantasies reenact the violence of racialization and sexualization at one level, these imagined scenarios reveal that the true desire staged in the scene of cuckoldry (rehearsal of the debasement of a privileged term within the political-philosophical binaries which constitute the ways in which we see and classify subjects) is a desire to abolish the self. In this way, pornography helps expose unconscious desires that structure our sense of self, and reveals that our death fetish may be better rephrased as pertaining to a libidinal economy that must constantly ward off excess through the sacrifice of an 'accursed share' that is profoundly linked with our fascination with 'filth.'[16] This is particularly true in modern liberal secular society, which functions on a particular kind of atomization that, while based on information and communication technologies, in fact drives us further from one another. We are obsessed with both the nature of our moral corruption (though the way in which this plays out and even this concept of sin is upheld by a particular Christian lens through which the Western world has been shaped) and we are obsessed with subterranean aspects of the libidinal economy that our desires have helped form.

Humans are caught in a cognitive catch 22, limited in that they can neither fully understand another subject except through a symbolic mediator nor can they fully apprehend the complex continuum that constitutes the Self. We are automatons in a very literal sense, since so many of the body's functions would fail if they were voluntary, and it is only through the use of language between ourselves and others that our emotions and cognition can be examined. Because of these gaps in egocentric cognitive models, true death of the self is an experience that lies outside the realm of that which we can cognitively and rationally describe, yet we are inextricably bound to this pursuit. Our propulsion towards ego death is the result of a lapse in our ability to fully perceive our selfhood in its entirety (the transparency of the phenomenal self-model).[17] Though our current techno-social medium nudges us towards atomization, it obscures the fact that our 'self' is formed through reciprocal relations with others, and thus our push towards a unified comprehension of the self is bound up with those libidinal processes constituting the technics and erotics of the self, and those epistemological transitions and synthetic gluings between that which is organic and inorganic.

Restoration of the Libido

In a historic letter, an adolescent Arthur Rimbaud wrote, "Je est un autre," which translates to "I Is another" or "I Is Somebody Else." The uncanny beauty and horror of these few words lies in their phraseology, in that they are fundamentally grammatically incorrect. If Rimbaud meant to say "I am somebody else" he *would* have written "Je *suis* un autre." The use of *est* suggests an objectification of self that *suis* could not convey, because *est* like the English *is* can only be used in this way as regarding something other than oneself. We say such things as *that* is, *it* is, *she* is, *life* is, *time* is, and *desire* is but never *I* is because we otherwise would be committing a cultural faux pas whose consequence is perceived ignorance. From birth, children are immersed in complex grammatical structures which convey a sense of distinct separation of self from society as a whole—a separation which isn't really there. At the same time, we accept *we are* as our one and only tool for attaching ourselves to an outsider or to a whole. By saying *I is another* Rimbaud rejects the notion that he is a self outside this other.

Footnotes

1. Hortense J. Spillers. "Mama's Baby, Papa's Maybe." Feminisms, 1987, pp. 384–405.

2. James Johnson. "Being and Becoming Human: Weheliye's Radical Emancipation Theory and the Flesh and Body of Black Studies." EHJ9, no. 2 (2017), pp. 24–66. https://earlham.edu/media/3410910/being-and-becoming-human.pdf.

3. Pamela V. Liao and Janet Dollin. "Half A Century of the Oral Contraceptive Pill: Historical Review and View to the Future." Canadian Family Physician, 2012.

4. Paul B. Preciado. Testo Junkie Sex, Drugs, and Biopolitics in the Pharmacopornographic Era. Feminist Press, 2017.

5. Sylvia Wynter, "The Ceremony Found: Towards the Autopoetic Turn/Overturn, Its Autonomy of Human Agency and Extraterritoriality of (Self-)Cognition1." Black Knowledges/Black Struggles, Jan. 2015, pp. 184–252.

6. Metzinger talks about various aspects of phenomenal experience that are invariant, including the sense of "mineness" accompanying perceptions and bodily movements, and the specific temporality of human consciousness. These ground, or are grounded in, what he calls the "world zero model," against which counterfactual projections/dreams/hallucinations can be discriminated.

7. Marx. Capital, Chapter 9.

8. See Marx's essay On the Jewish Question.

9. Anita Phillips, A Defense of Masochism. St Martins Pr, 1998.

10. Julie Beck. “Married to a Doll: Why One Man Advocates Synthetic Love.” The Atlantic, 6 Sept. 2013.

11. Beck, “Married to a Doll.”

12. Anxiety and dread here are related to Kierkegaard’s notion of these ideas.

13. Andrea Dworkin. Pornography: Men Possessing Women. The Women’s Press, 1999, p. 100.

14. Dworkin. Pornography, p. 175.

15. Here, “objects” refers to both subjects, like actors, and actual objects.

16. Filth has multiple meanings, including that which is foul both literally and symbolically, (e.g., in reference to pornography, or in reference to dirt), but it also has relevance here as a term that denotes moral defilement. Our attraction to smut, gravitation towards it, mimics our relationship with what is seen as morally corrupt, and this is influenced by Judeo-Christian ideas. Even after their dissolution, within what is deemed the secular world this patterning remains, be it beneath thinly veiled economic relations or behind social conventions.

17. Thomas Metzinger. Being No One: The Self-Model Theory of Subjectivity. The MIT Press, 2006.

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